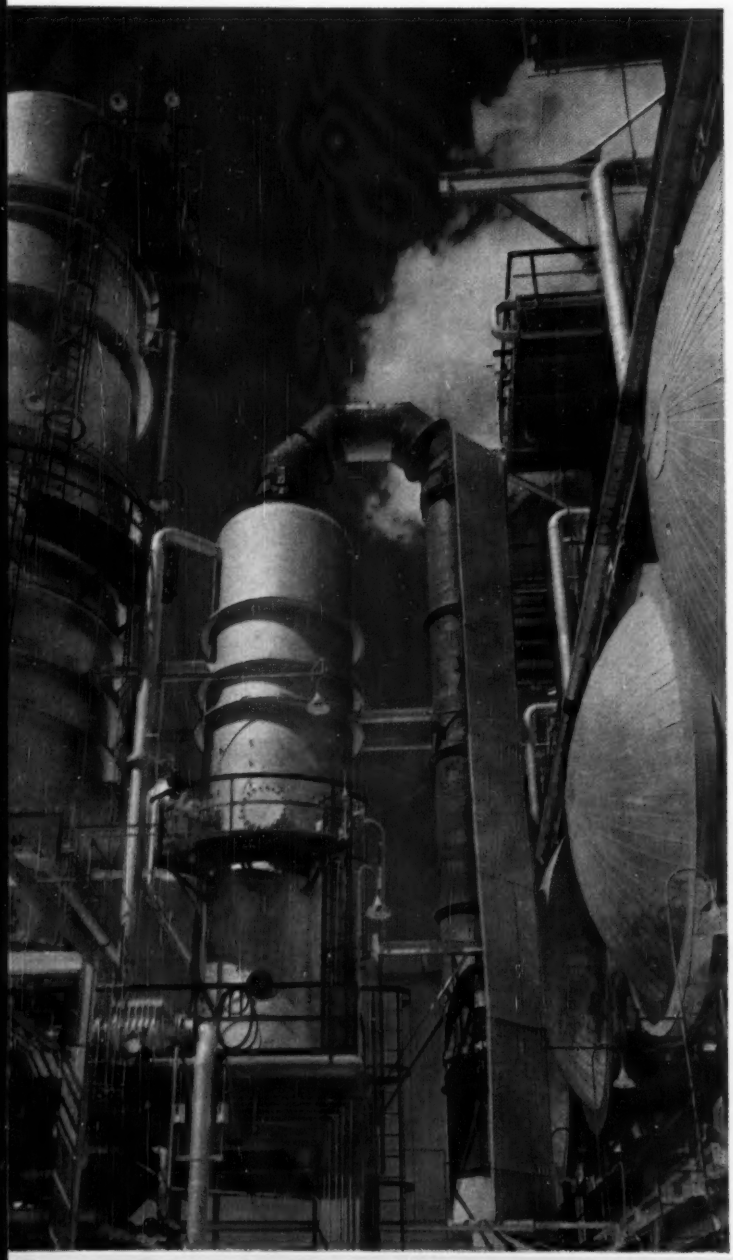
Chemical Week



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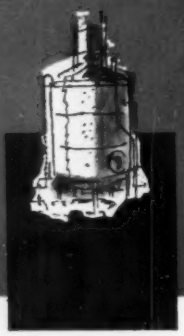

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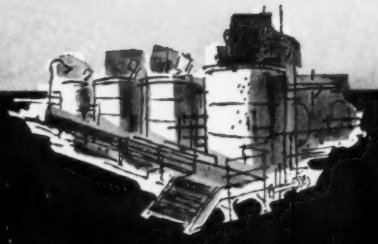
Stainless Steel Reactor for Processing



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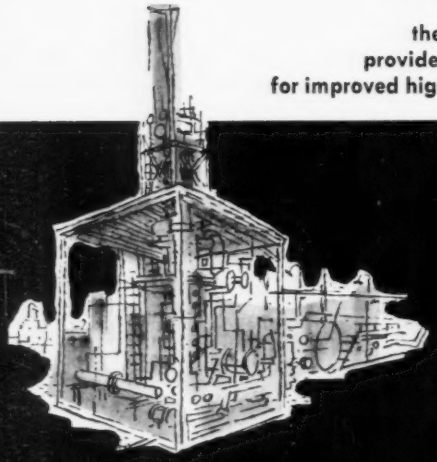
Available for all high pressure operations including hydrogenations, ethoxylations and reductions, these facilities and appurtenances provide the answer to industry's need for improved high pressure processing equipment.



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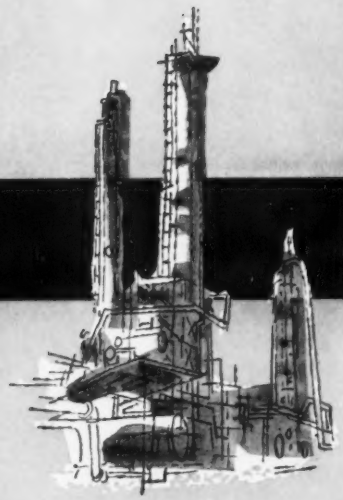

The facilities and experience of Truland may be employed advantageously for the economical upgrading and disposal of solvent mixtures and organic by-products. Our technically trained personnel will gladly discuss your specific requirements and a cordial invitation is extended for you to inspect our new facilities.

Send **for illustrated booklet which describes our operation**

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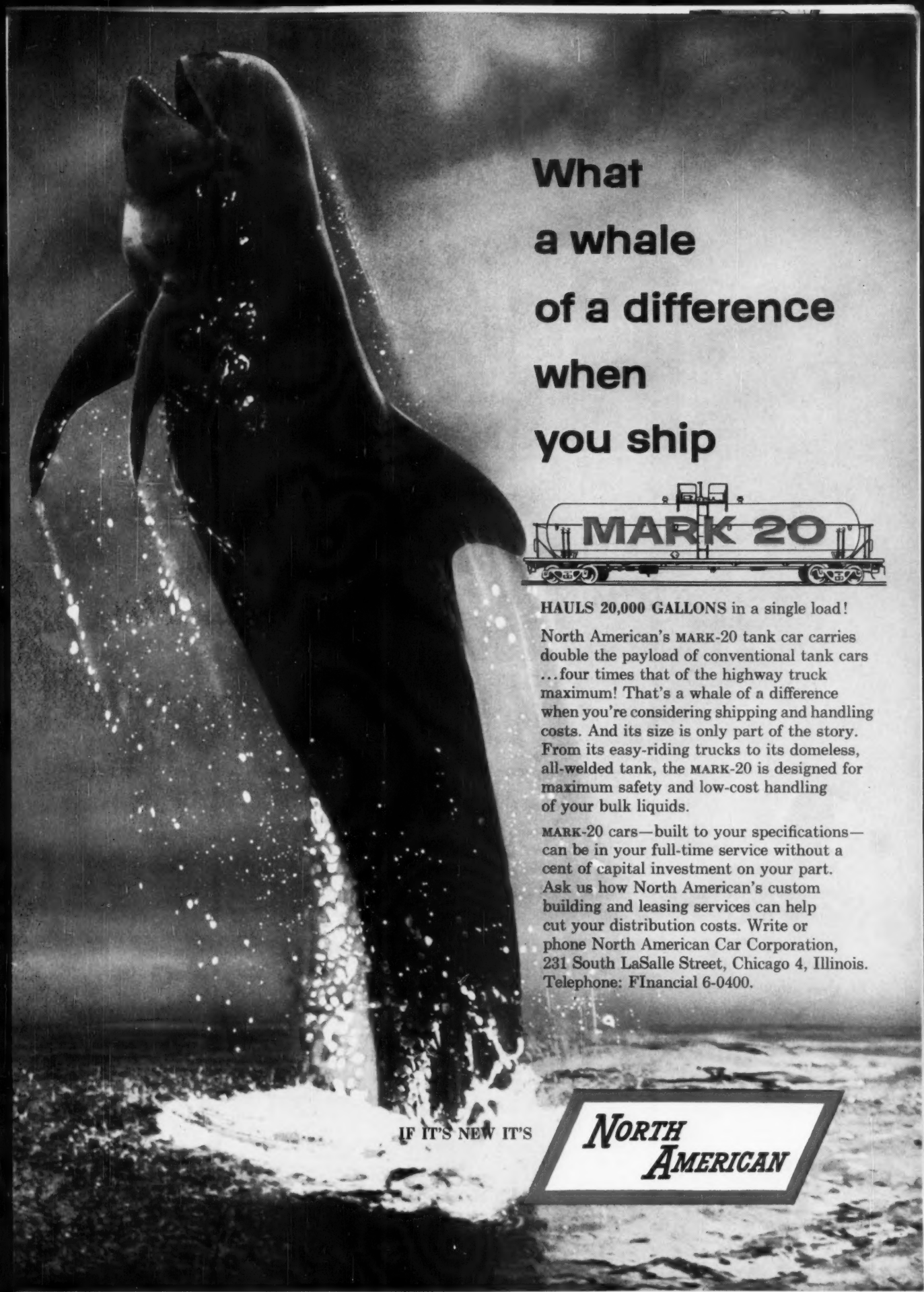

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North American's MARK-20 tank car carries double the payload of conventional tank cars ...four times that of the highway truck maximum! That's a whale of a difference when you're considering shipping and handling costs. And its size is only part of the story. From its easy-riding trucks to its domeless, all-welded tank, the MARK-20 is designed for maximum safety and low-cost handling of your bulk liquids.

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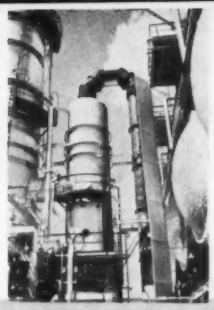
NORTH AMERICAN



ON THE COVER: Firestone Tire & Rubber's 120-million-lbs./-year butadiene plant (Orange, Tex.) utilizes Houdry Process Corp.'s dehydrogenation process to convert butylenes.

Chemical Week

Vol. 86, No. 22 MAY 28, 1960

Chemical Week (including Chemical Specialties and Chemical Industries) is published weekly by McGraw-Hill Publishing Co., James H. McGraw (1860-1948), founder. EXECUTIVE, EDITORIAL, CIRCULATION AND ADVERTISING OFFICES: McGraw-Hill Building, 330 West 42nd St., New York 36, N. Y. Place of publication: 3rd and Hunting Park Ave., Philadelphia 40, Pa. Second class postage paid at Philadelphia. (See below for directions regarding subscriptions or change of address.) OFFICERS OF THE PUBLICATIONS DIVISION: Nelson L. Bond, president; Shelton Fisher, Wallace F. Traendly, senior vice-presidents; John R. Callaham, vice-president and editorial director; Joseph H. Allen, vice-president and director of advertising sales; A. R. Venezian, vice-president and circulation coordinator. OFFICERS OF THE CORPORATION: Donald C. McGraw, president; Joseph A. Gerardi, Hugh J. Kelly, Harry L. Waddell, executive vice-presidents; L. Keith Goodrich, vice-president and treasurer; John J. Cooke, secretary.

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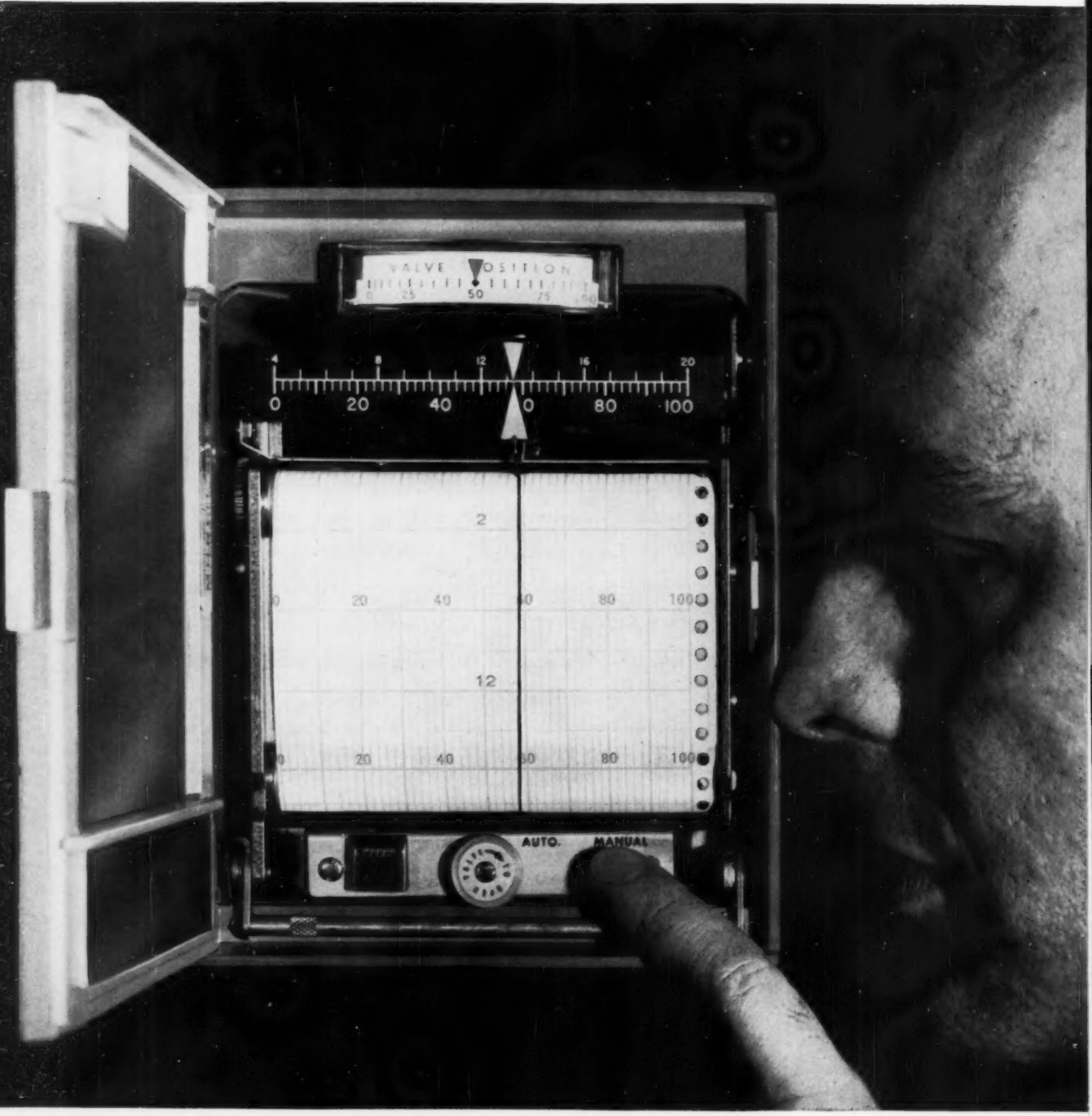
New *ElectriK Tel-O-Set*... needs in a single compact



everything an operator control station

This Honeywell electric control station meets all of your requirements for operator convenience.

One compact case houses *every* function the operator needs to supervise a control loop: indication of process variable and set point on the same scale; the controls needed to switch from automatic to manual; controls for manual control; and indication of valve position.

The *ElectriK Tel-O-Set* control station assures easier bumpless transfer than ever before available because there's no need to "line up" or "match" pointers. A null balance indicator eliminates guesswork, and the transfer doesn't have to be hurried since the valve remains under control during the transfer.

You can also order the controller with the proportional band, rate, and reset adjustments on the front of the panel conveniently located below the control station, or at the rear of the panel.

These are just a few of the features that make the new *ElectriK Tel-O-Set* control system an outstanding value. Your Honeywell engineer can give you complete details. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Fall River, Massachusetts.

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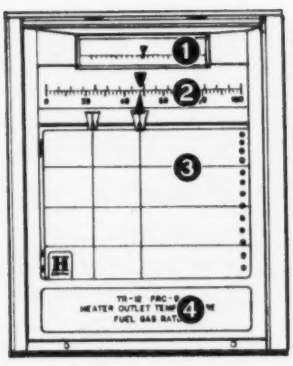
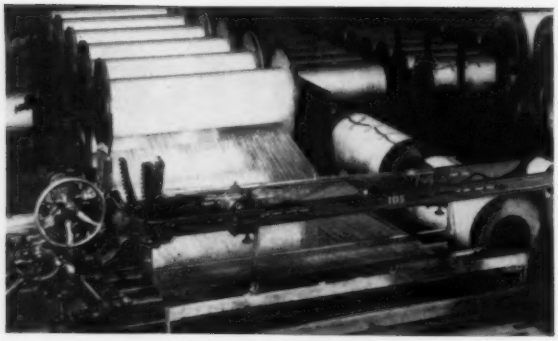
Honeywell

First in Control SINCE 1885



1. Valve position indicator continuously indicates controller output when on automatic control.
2. Set point index is conveniently located on same scale as process-variable pointer; you can see from a distance any deviation of variable from set point.
3. Rectilinear 4-inch calibrated chart is easy to read. At standard chart speed, four hours of recording is always visible. Unit has daily chart tear off or 30-day rewind. Both recorder and control station take the same 5½" x 6" panel cutout.
4. You get bumpless switching from automatic to manual control because you don't have to match pointers. In the balance position, the valve position indicator is part of a null circuit that compares controller output and manual output. When indicator reads 50%, both outputs are perfectly matched.



Chemicals from Armour for Textile

In the past several years, Armour's research men have spent considerable time studying the needs of the textile industry. The information and chemicals featured here are related to some of the more important areas that have been investigated. These Armour cationic chemicals offer substantial improvement over many presently used chemicals. Particular attention should be given to the effectiveness of these Armour chemicals with the many synthetic fibers that are currently so popular.

Improved starch sizes

The use of unmodified starch as a textile warp size has certain disadvantages. The addition of small amounts of an *Arquad*® can overcome some of these faults. Tests of Arquad 12-33, at a use level of 4 oz. per 200 gals. of starch formulation, show the following advantages:

Increased tensile strength and improved elasticity. Numerous tensilometer tests have shown such improvements in cotton yarn.

Better penetration. Better penetration leads to a more even deposition of the starch. Less flaking of the more flexible film and less shedding of fine fiber ends were noted.

Lower viscosity. A small reduction in initial viscosity was obtained and starch solids stayed in suspension longer. Gel formation of the cooled solution was reduced.

Dye-leveling aids

Armour's *Ethoquad*® (Polyethoxylated Quaternary) compounds are doubly important because their use proves valuable in the two major steps that occur in the acceptance of a dye by fiber.

In the first stage, when dye and fiber initially meet, the Armour chemicals act as dye-retarding agents and slow the initial rate of dye exhaustion. The Ethoquads, being cationic surfactants, reduce the rate of initial exhaustion and permit a more gradual deposition of the dyestuff for uniform dyeing of the fabric.

In the second stage of dyeing, penetration into the inner portions of the fiber occurs. Improper absorption would result in uneven distribution, with high dye concentrations only on the outer skin of the fiber. Here again, the Ethoquads do a superior job. They reduce surface tension and aid in wetting the fabric. In addition to greater dye penetration, the Ethoquads help establish a more favorable adsorption-desorption equilibrium to equalize dye concentrations over the surface.

Initial tests of the Ethoquads as dye-levelers indicate that improved processes and products will result from using these quaternary ammonium compounds.

Durable water repellents

Although there are several types of water repellents in use today, it is generally recognized that the more versatile and durable types are based on fatty amides. Derivatives of Armour's *Armid*® HT offer many advantages in this application.

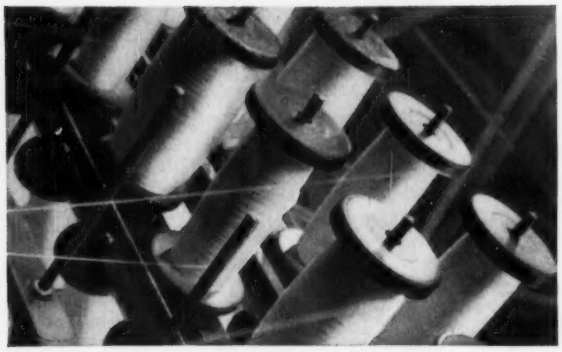
These derivatives of Armid HT are modified into thermally unstable quaternary ammonium salts. These salts are applied to fabrics from an aqueous dispersion and converted under heat, probably leaving an insoluble, durable methylene bis-stearmide water-repellent residue within the fabric. Repeated washings or dry cleanings have little effect on the repellency properties of treated fabrics. This same finish also permits the fabric to "breathe," and enhances wrinkle-resistance.

The excellent water repellent properties of the Armid HT derivatives are due mainly to the combination of the amide groupings with the long, saturated straight chains. These compounds have high-melting points and are poorly emulsified with ordinary soaps and detergents, which makes them highly resistant to laundering.

Anti-static agents

In an effort to obtain more satisfactory anti-static agents for textiles, Armour tested more than one hundred different compounds.

Results showed that three classes of Armour compounds had marked superiority. Armour's Ethoquad



Processing

series, *Ethomeen*® R/12 series, and Arquad series proved to be excellent anti-static agents for a wide range of textiles. In some cases it is recommended that a combination of Ethomeens and Arquads be used for most satisfactory results.

The Ethoquads are especially suitable when operations require removal of anti-static agents after processing, because they can be easily removed from fibers with a warm water rinse. Generally, as little as 0.1 to 0.2 percent of Ethoquad will reduce processing difficulties caused by static charges.

Manufacturers of wool-synthetic blends, made on faster processing machinery, should be particularly interested in these compounds. Use of some of these Armour anti-static agents will allow them to maintain quality and, at the same time, speed-up production.

A number of these Armour compounds also exhibit good softening properties on various fibers.

Fabric softeners and conditioners

Arquad 2HT is most notable for its softening effect on cotton without imparting surface oiliness. This positively charged chemical is attracted to the negatively charged textile fibers. The chemical molecule then orients itself around the fiber, leaving two fatty chains exposed to give maximum surface softness.

Arquad 2HT is compatible with many of the common finishing agents such as dextrins, glue, gelatin and the polyvinyl acetate and/or chloride emulsions.

Arquad 2HT is used as a basic ingredient by manufacturers of fabric conditioners for home or commercial laundry use. Arquad 2HT is not a water softener, soap or detergent, but a fabric softener. Results are exceptional because the Arquad is a fabric softener which also eliminates static electricity, makes ironing easier, improves the appearance of wash 'n wear items, and promotes faster drying. Fabrics can be dried indoors, outdoors or in a dryer with the same fine softening effect.

For additional information on all these Armour chemicals for textile processing, and for samples for your own testing, use the convenient coupon.

VIEWPOINT

Optimism: A Sober View

WHEN THE RECESSION ENDED early last year it was inevitable that economists, market forecasters, government officials, Wall Streeters and others, would focus their attention on the likely tack the economy would take from then on. Indeed, the latter part of '59 brought a plethora of predictions on the economy.

Company executives at countless industry luncheons and dinners felt impelled to forecast; thousands of "private" letters poured out of investment houses; reports and articles surveying industry opinion on the near- and long-term markets situation crowded newspaper and business magazine pages.

The theme was identical: optimism. And this optimism was understandable, since we stood on the threshold of a new decade—the "Golden, Soaring, Sizzling Sixties."

The steel strike was over. Inventories were being replenished. The auto industry foresaw the best year ever. Industrial and housing construction were slated to soar. Typical of the predictions was the U.S. Commerce Dept.'s forecast that "'60 would be better than '59, which was the best year yet." The gross national product (GNP) was expected to break the half-trillion-dollar mark in the first half of the year "and go to still higher levels a year from now."

But here and there, "realists" began decrying the "overoptimism." Their hue and cry has been loud enough to convince the timid that fluctuations in the stock market, or a slowing in steel production from one week to the next, presaged dark days of depression.

That's a strange and startling premise on which to re-evaluate a 10-year outlook—when we are only five months into the new decade.

Have economic conditions changed so in that time to warrant a decisive switch to pessimism? We don't think so. In fact, there is more basis for optimism today than there was late last year:

In mid-May, the President revealed what he termed "good news" in the economic field. The GNP had actually passed the $500-billion annual-rate mark in '60's first quarter—was up to $500.2 billion, an increase of $2.2 billion over earlier estimates, $16.7 billion over fourth-quarter '59.

A week later the government's Business Advisory Council, a group of over 100 top businessmen, went even further, predicted the GNP would rise to $515 billion by the end of '60, move up to $517 billion in first-quarter '61.

Plant and equipment spending by U.S. industries is estimated to rise to a rate of $37 billion by the end of '60, matching '57's record rate.

The outlook for automobile production (a prime market for chemicals) is bright. Last month S. E. Knudsen, General Motors vice-president, forecast sales of 6.9 million new cars in '60.

Housing starts are up. The U.S. Census Bureau reports that the seasonally adjusted annual rate of new housing construction was up to 1,135,000 units in April—still below April '59's 1,434,000 but an improvement over March '60.

And CHEMICAL WEEK's new compilation of industry consensus shows that nearly all chemical companies set new records for first-quarter sales; and profits generally were up, compared with either the preceding quarter or the corresponding period of a year ago.

Granted this is no time for overoptimism by management. Nor is it time for retrenchment. Let's be realistic, for—barring war—the prospect for this year and the decade ahead is still mighty favorable.

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LETTERS

Factor of Twelve

TO THE EDITOR: Although we appreciate that the error concerning the dimensions of Avistrap cord strapping (*May 7*) was strictly a misprint, we should like to call to your attention the fact that a 1,000-yd. spool of Avistrap measures 13½ in. in diameter and is only 6 in., not 6 ft., wide. . . .

JOHN GRUENBERG, II
Arndt-Preston-Chapin-Lamb & Keen Inc.
Philadelphia

A " became a ' in transmission to the printer—Ed.

Cryovac Thickness

TO THE EDITOR: The summary of the relative properties of Cryovac L and Kordite 1500 (*CW Market Newsletter, April 23*) appeared accurate except for one important aspect. You quote the base price of Cryovac L film as 3¢/1,000 sq.in. in ½-mil thickness. This should be corrected to read 3¢/1,000 sq.in. in 1-mil thickness.

One other important feature omitted is the fact that Cryovac L, like the Kordite film, is an excellent moisture barrier and is applicable for wrapping items requiring moisture protection.

JAMES S. COOK
W. R. Grace & Co.
Cryovac Division
Cambridge, Mass.

Cellophane Will Grow

TO THE EDITOR: . . . [Re] your article [on films] (*April 16, p. 116*). . . . In the main, I think your comments and your point of view can be found generally acceptable.

Surely there is no quarrel with the fact that all transparent films are aimed at the cellophane markets; and, in spite of that, I have been so rash as to predict that cellophane will grow very substantially. I believe this, based upon one particular premise, among others. And that is that in '59 cellophane enjoyed one of its greatest growth years, and in the first quarter of this year, it grew another 6 million lbs. in spite of all of the competition from any different types of transparent films and five years of intense competition with lower-priced polyethylene.

The most significant thing, I believe, is that in industries where polyethylene competition began the earliest and continued the strongest, cellophane sales still continued to expand. In all honesty, I think that anyone who attempts prediction with preciseness in a market as explosive and vital as the actual and potential market for films is assuming possession of a crystal ball that has not yet been made.

It is my own view, as I stated, that cellophane will grow because of the almost infinite possibilities of product modification and that the entire market for films will grow. . . .

R. R. SMITH
Director of Sales
E. I. du Pont de Nemours & Co.
Wilmington, Del.

MEETINGS

The Materials Handling Institute, New England show, Commonwealth Armory, Boston, June 6-8.

1960 International Powder Metallurgy Conference, Biltmore Hotel, New York June 13-15.

Synthetic Organic Chemical Manufacturers Assn., meeting, Roosevelt Hotel, New York, June 14.

Technical Assn. of the Pulp & Paper Industry, pulp bleaching conference, Edgewater Beach Hotel, Chicago, June 14-16.

Parenteral Drug Assn., Edgewater Beach Hotel, Chicago, June 24.

Columbia University Industrial Research Conference, Arden House, Harriman, N. Y., Aug. 7-13.

Heat Transfer Conference and Exhibit, Statler-Hilton Hotel, Buffalo, N. Y., Aug. 15-17.

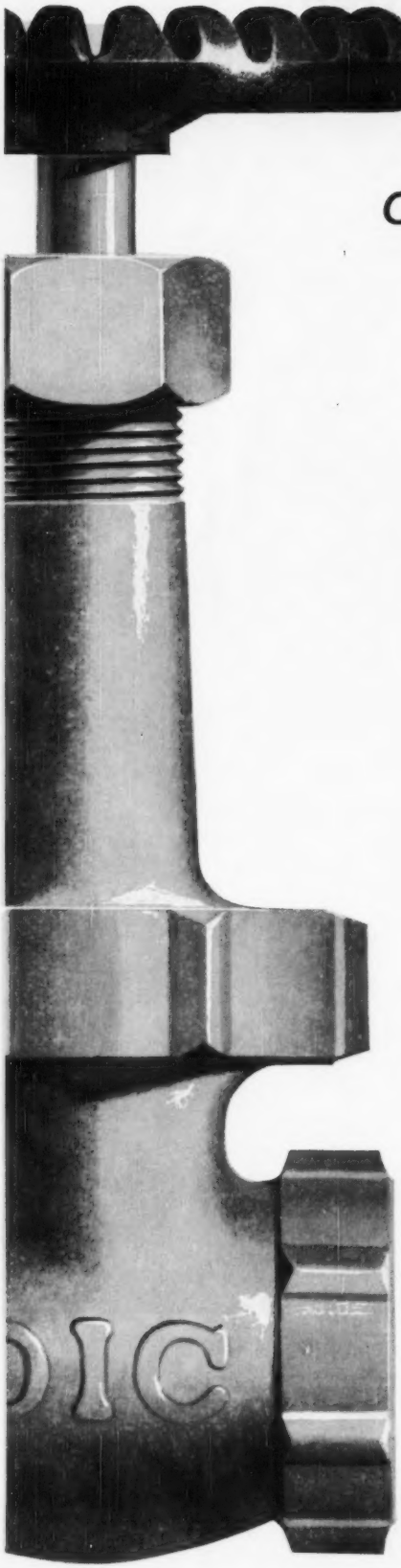
Cryogenic Engineering Conference, University of Colorado, Boulder, Colo. Aug. 22-24.

Technical Assn. of the Pulp and Paper Industry, alkaline pulping conference, Multnomah Hotel, Portland, Ore., Aug. 22-24.

Joint Automatic Control Conference, Massachusetts Institute of Technology, Cambridge, Mass., Sept. 7-9.

American Chemical Society, National meeting, New York, N. Y., Sept. 11-16.

Society of Plastic Engineers, conference, theme: plastics in business machinery; Binghamton, N. Y., Sept. 22.



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CHEMICAL WEEK

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September 24, 1960
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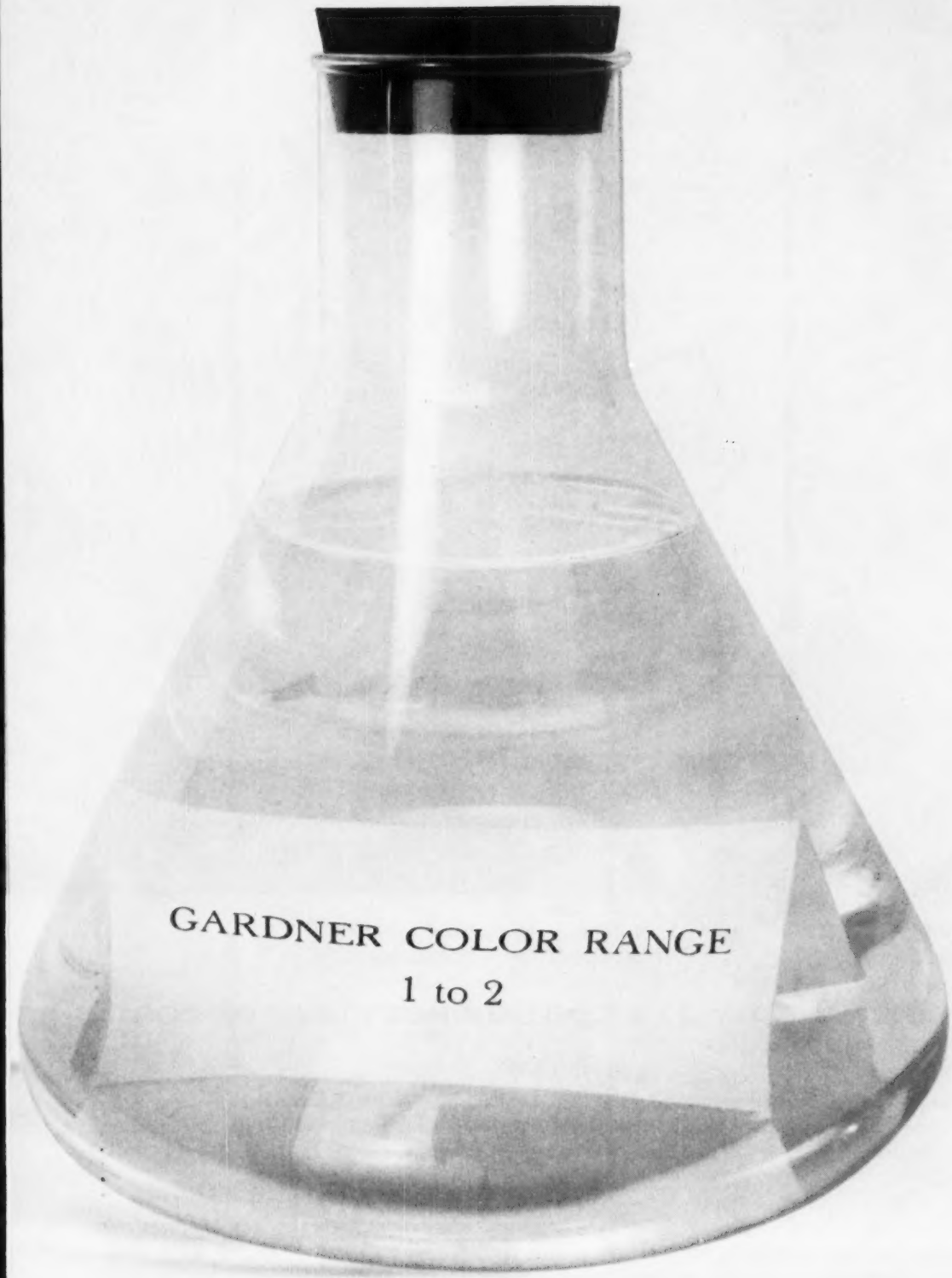
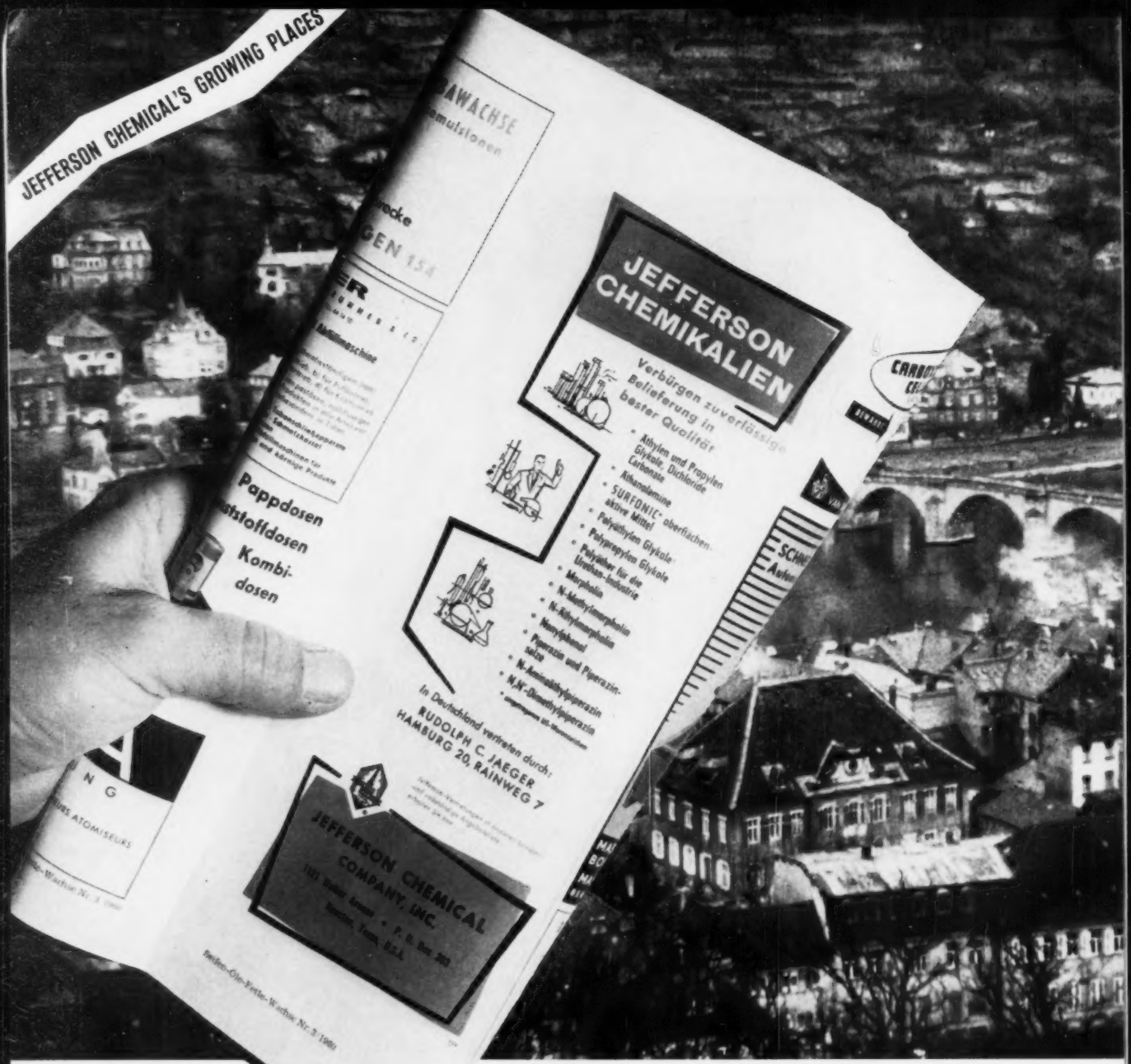

GARDNER COLOR RANGE
1 to 2



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JEFFERSON CHEMICALS

Business
Newsletter

CHEMICAL WEEK
May 28, 1960

Chemical producers rushing for tariff protection will be disappointed by the last White House policy move. After heated Cabinet debate, the Administration has decided to stick to its free-trade policy next fall when member nations of the General Agreement on Tariffs and Trade (GATT) hold an international tariff bargaining session in Geneva.

At the urging of Under Secretary of State Douglas Dillon, the Administration will offer as many concessions as possible to induce Europe's two trading blocs to minimize their discrimination against U.S. goods. Within the next two weeks, President Eisenhower will release a list of several thousand items on which the Administration proposes to offer concessions at Geneva. Domestic producers will get a chance to request deletions at public hearings on the list. Some election-year compromises will be made, and there is a strong possibility that some chemical products will be kept off the tariff-cut list.

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England's linear polyolefin capacity will take a big jump when a new Shell Chemical Co. Ltd. plant is completed early next year. The plant, now under construction at Shell's Carrington complex, will produce 30,000 long tons/year of polyethylene and polypropylene. Ultimately, capacity will be boosted to 50,000 l.t., including about 10,000 tons of high-density polyethylene to be made under a Ziegler license. Shell's present polyethylene output is only 1,000 l.t./year.

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Russia's chemical plant purchases from Western Europe are paying off in significant jumps in capacity. New plants helped increase Soviet output of synthetic and staple fiber fivefold last year, compared with '58 levels. Caustic soda output was also up fivefold: synthetic ammonia, polyethylene and polypropylene, fourfold: and production of motor vehicle tires doubled. This year the Russians plan to invest 9.5 billion rubles ($2.7 billion) in the chemical industry, a marked increase over the 6 billion rubles spent in '59.

More Russian-bound equipment shipments are on the way. This month Courtaulds is slated to begin shipping plants for production of rayon tire cord, acrylic staple fiber, and acetate yarn under contracts worth some $42 million, which were signed a year ago. Earlier this year Courtaulds finished shipping (in 11,000 large crates) equipment for the separate $13-million acetate plant it's building in the Soviet Union. Volume of British chemical equipment shipments to the U.S.S.R. will be even higher next year—barring further serious deterioration of East-West relations—as already-signed contracts are fulfilled.

Russia is buying chemical products as well as equipment in trying to supply growing consumer demand. One of the chief beneficiaries of the Russian purchasing drive is Imperial Chemical Industries Ltd. Along with process know-how, ICI says it's exporting a wide range of plastics to Russia, including polyethylene and polyvinyl chloride. To help boost sales,

ICI will stage a plastics exhibition in Moscow (June 3-17) and Leningrad (July 15-30). ICI will display a wide range of plastic products, such as boats, flooring, and industrial belts, and ICI chemists and technicians will give lectures on production and application techniques. Another British firm, R.H. Winsor Ltd., will demonstrate extrusion machinery.

Chemical output of Russia's main chemical satellite, East Germany, rose 9% during the first quarter, over first-quarter '59. Some output figures: sulfuric acid, 140,100 tons, up 2.7%; soda ash, 148,600 tons, up 5.4%; calcium carbide, 228,300 tons, up 5.9%; phosphorus and nitrate fertilizers, 129,100 tons, up 5.2%.

•

Petro-Tex now confirms it will build a maleic anhydride plant, as reported earlier (*see p. 72*). Although there's a cross-country wave of maleic projects under way, Petro-Tex says it will have two important advantages in the competitive struggle that lies ahead: (1) a new process based on "straightforward" oxidation of four-carbon feedstock; (2) location on its own plant site near Houston, Tex., where it will get feedstock and services from its existing facilities.

Petro-Tex says the process was developed by its own research staff and has been "thoroughly proved" in pilot-plant operations, with yields higher than those achieved by conventional, benzene-based processes. Engineering—being done by Scientific Design, which has engineered a number of conventional-process maleic plants—is substantially completed, and a contract has been let for construction of a 30-million-lbs./year plant, to be completed by mid-'61.

•

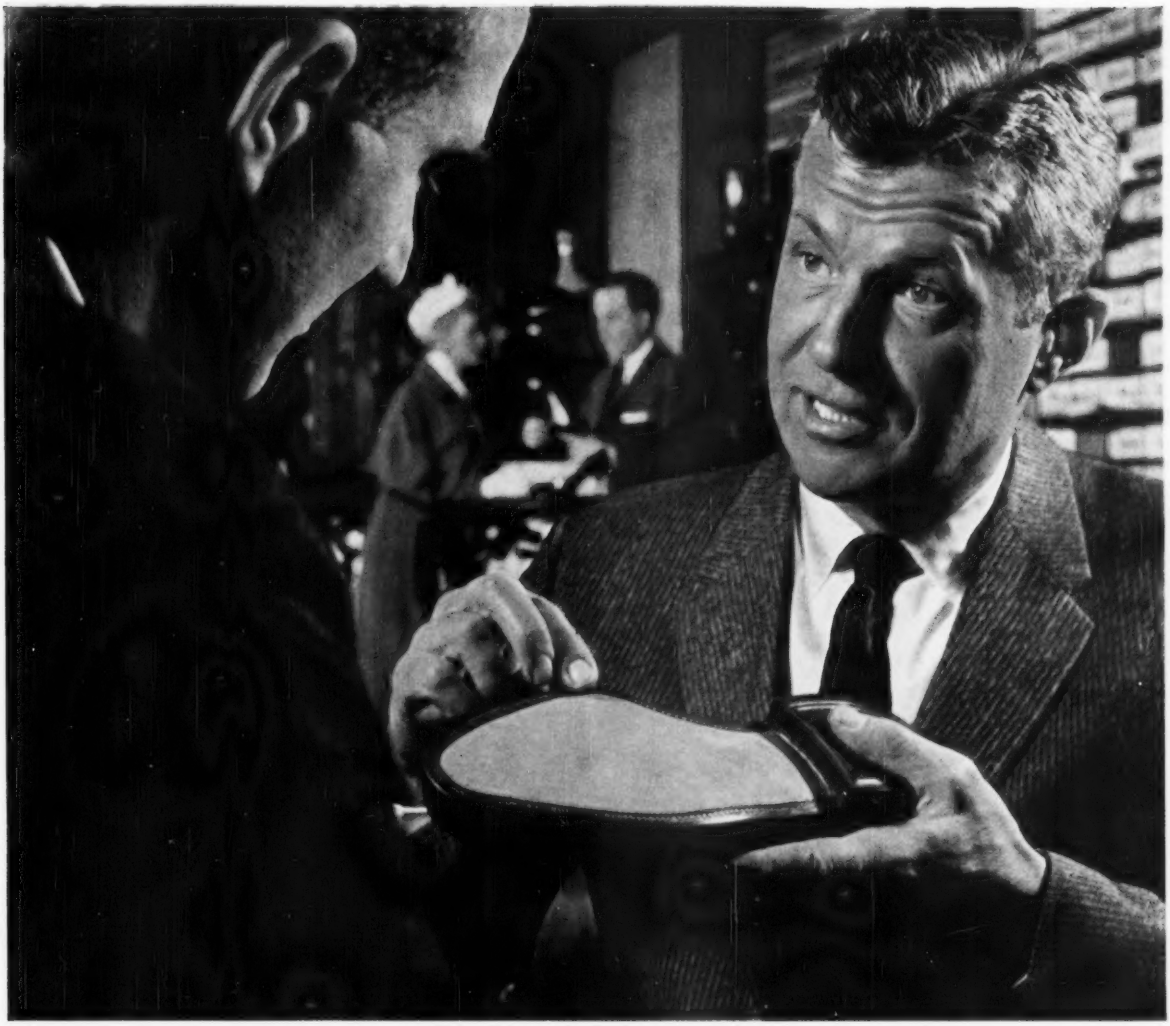
Two key expansion moves in the making:

• W. R. Grace & Co.'s Davison Chemical Division is shopping for a site for a $12-20-million plant to reprocess fuel elements from privately owned nuclear power plants. Sites under consideration are in Florida, Idaho, New York, South Carolina, possibly other states. Due soon: a report on a feasibility study for such a project, being made in conjunction with five electric utilities (*CW Technology Newsletter, Dec. 26, '59*).

• Rohm & Haas—whose purchase of the surplus butadiene plant at Louisville, Ky., is expected to round out the company's coverage of Eastern and Midwest markets—is negotiating for purchase of two 100-acre tracts at North Richmond, Calif., across the bay from San Francisco. The company says these lands would be for a future plant site and deep-water harbor facilities, but adds there are no present plans for construction.

•

Critical decisions are at hand this week for fiber producers. In Cleveland this Friday stockholders of Industrial Rayon will thrash out their differences on management and merger problems. Just last week the company revealed another "substantial reduction" of tire-cord operations at its Cleveland plant (*see p. 23*). And reportedly shaping up: a fiber company merger that would be bigger than the proposed Industrial Rayon-Texas Butadiene deal that was torpedoed by some IRC shareholders.



Newest best seller...soles of Ameripol Rubber

To rubber soling's well known virtues of durability and economy you can now add another advantage—exceptional appearance and smooth feel. As a result, this new product of Bearfoot Sole Company is enjoying spectacular sales in the quality, dress shoe market.

The new look is achieved by the use of advanced finishing techniques with a new rubber polymer—Ameripol 4600. Since the process demands that only a minimum of pigment may be used, the uniformity of color and texture must be inherent in the rubber raw material. Ameripol 4600 consistently meets the stringent requirements—and cuts processing costs in the bargain.

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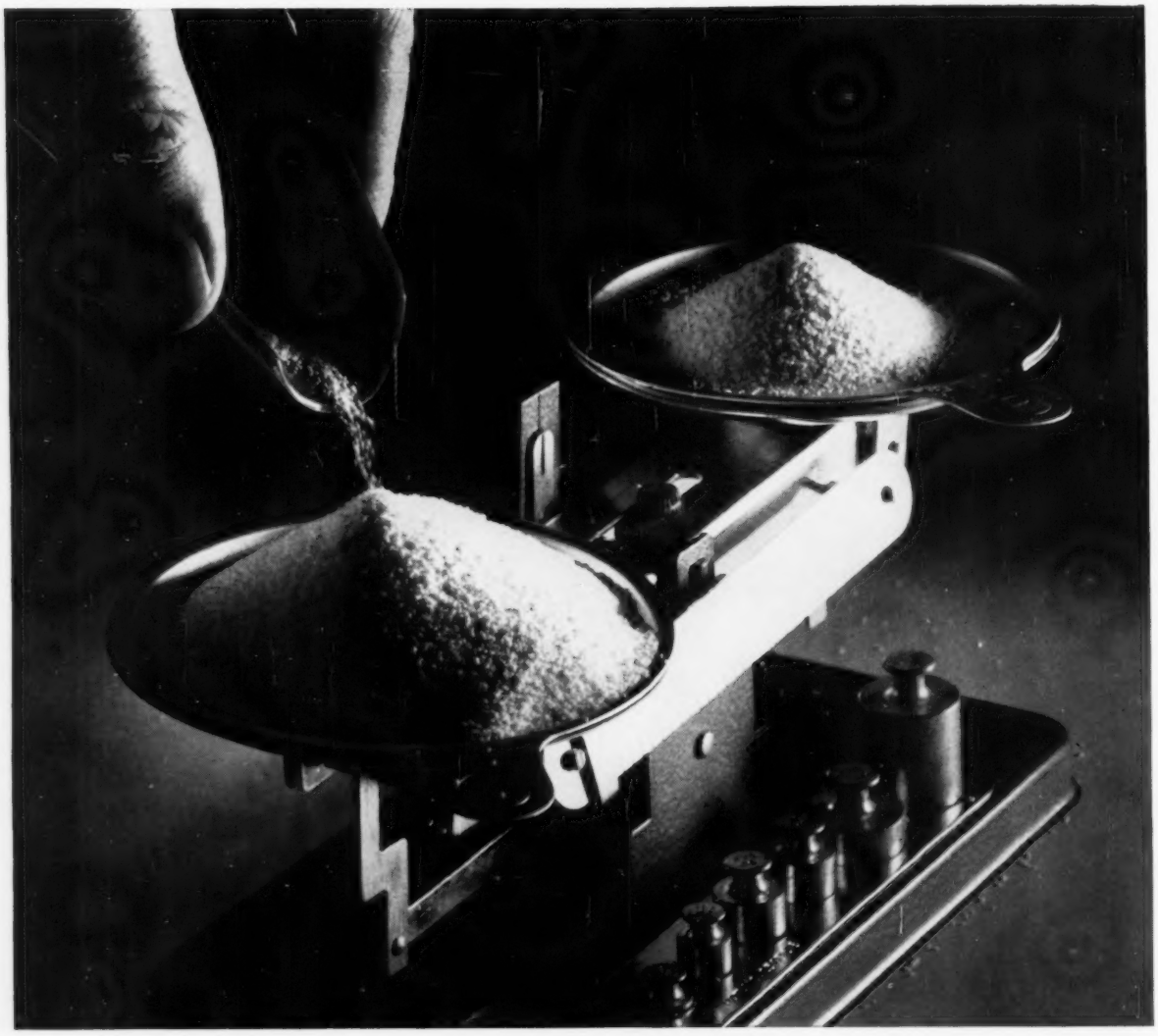

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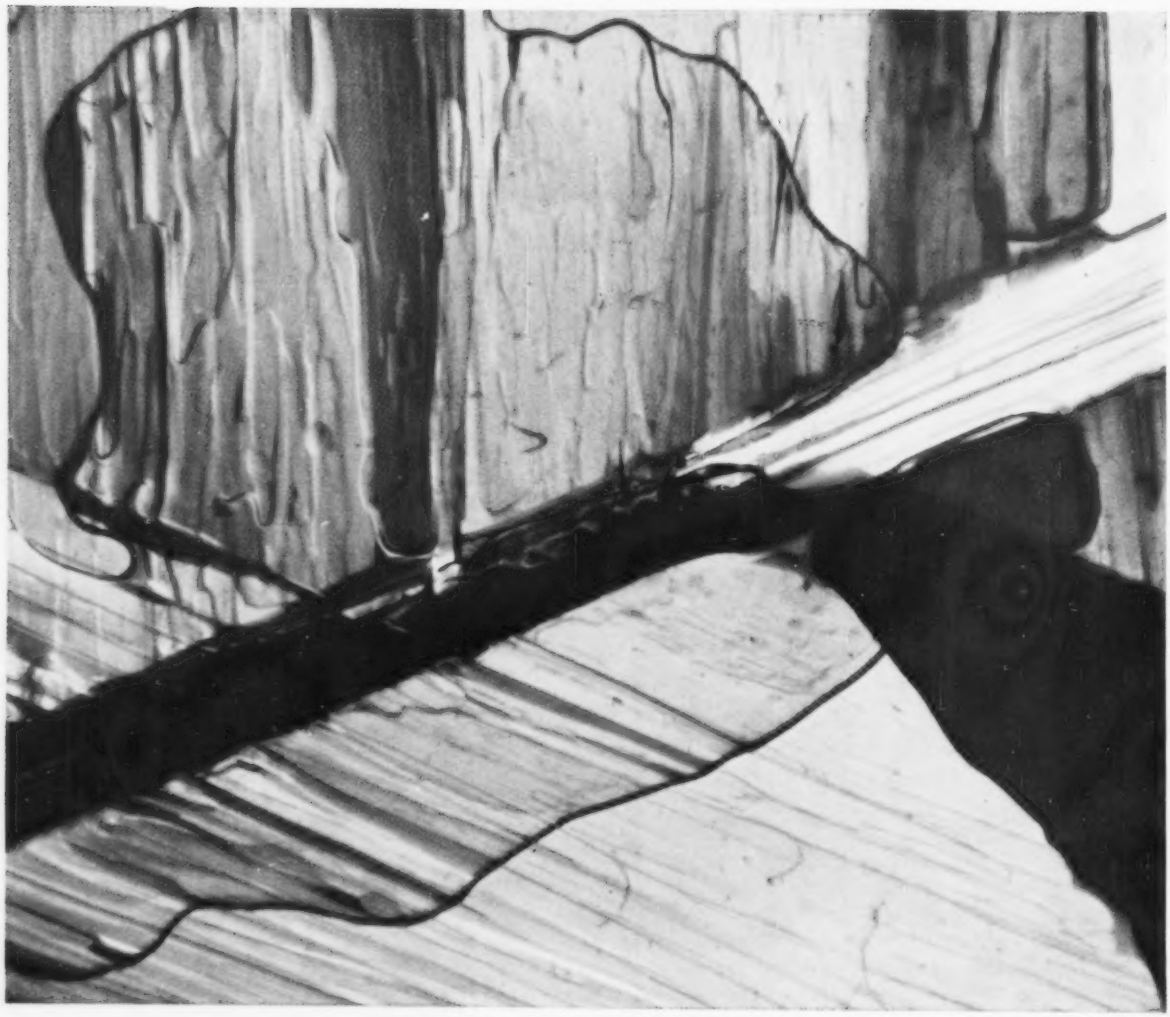

The Shell chemicals listed below are sources for many important commercial products.

Familiar landscape?

The inquiring chemist explores many interesting product "landscapes" in his work. This photomicrograph shows crystals of *tertiary butyl alcohol* at 65°F. TBA, a Shell chemical with intriguing features, finds its way into a variety of industries.

Shell manufactures more than thirty industrial chemicals—among them *allyl alcohol* and *allyl chloride*. Because of the di-functional nature of these two products, they are used as intermediates in the synthesis of many important chemicals. Derivatives of allyl alcohol are widely used in drugs and cosmetics. Allyl chloride is an intermediate in the synthesis of resins for thermosetting plastics, varnishes, and adhesives.

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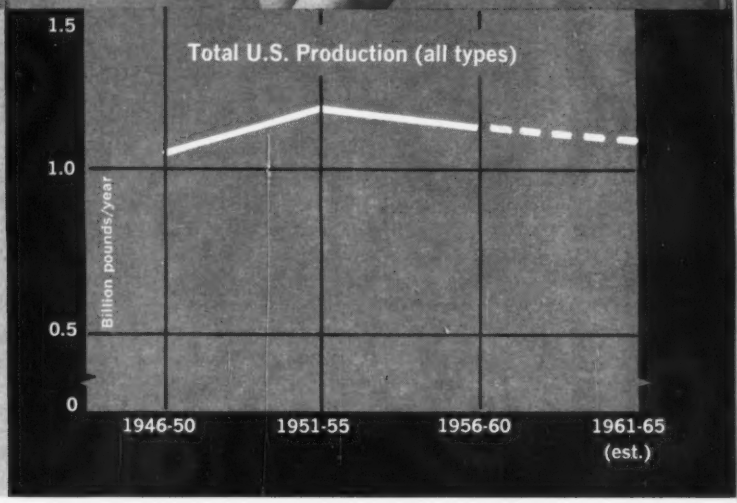
SHELL

Chemical Week — May 28, 1960

▲ **Gains in apparel applications . . .**

. . . Keep cellulosic fibers on even keel ▶



Cellulosic Fibers' New Lease on Life

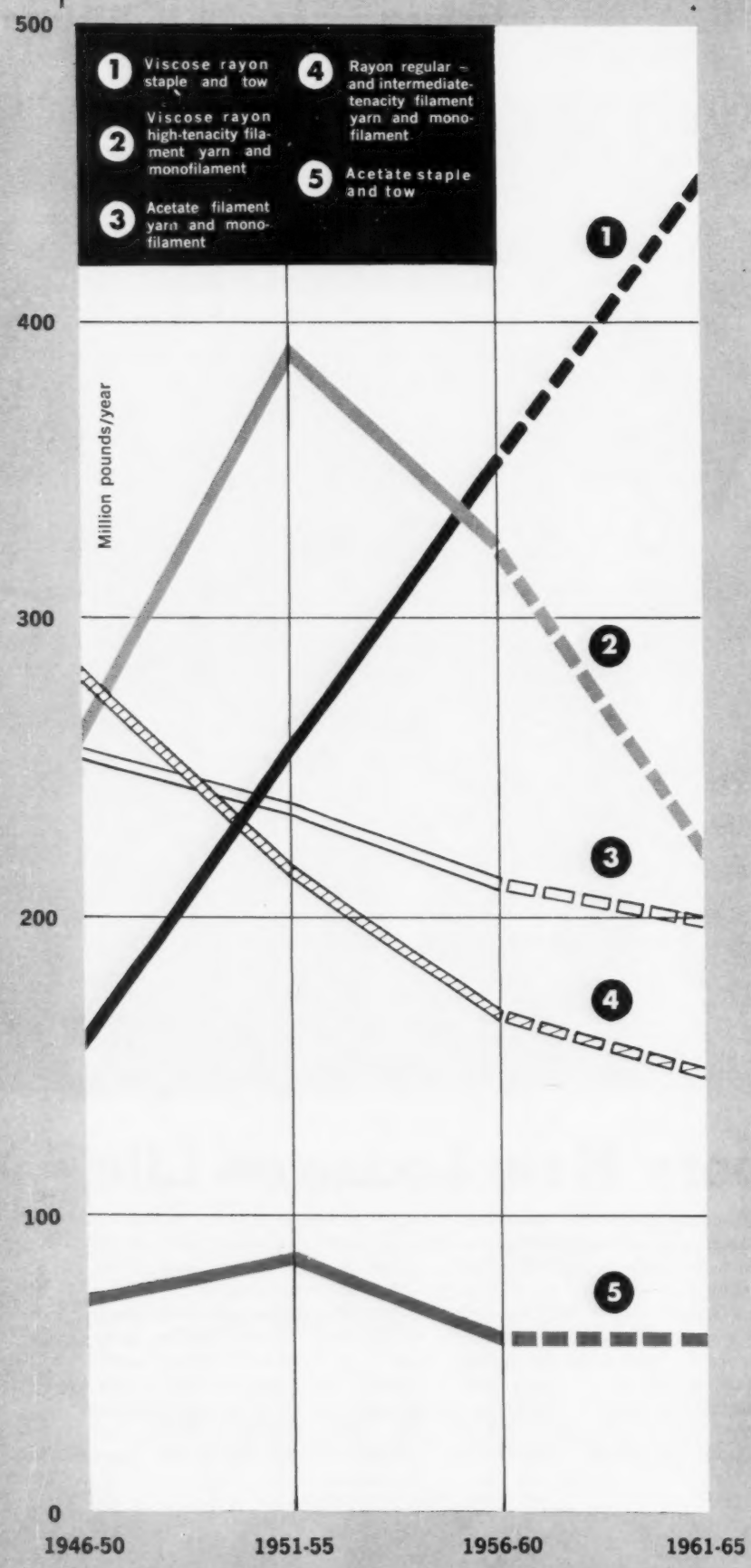
This week Hartford Fibres set September as official opening date of its new "modified rayon" (polynosic) fiber plant now being built at Rocky Hill, Conn. Hartford's move spotlights the many new-name rayon fibers coming along to compete with cotton—not on a price basis but on the basis of performance.

Chief aim: to capture markets as cotton replacements in the face of mounting competition from fast-growing, stronger, synthetic fibers.

Already there's evidence of sharply increased sales of viscose rayon staple fibers (*chart, p. 24*), with the new and improved fibers in this category expected to "take over" the apparel portion of the viscose staple fiber market in coming years. So it's now forecast that—largely as a result of the newer entrants—the cellulosics as a whole will be able to maintain a fairly stable production rate, despite serious declines in some areas of the vast viscose fiber market.

Tire-Cord Crisis: Sales of the newer viscose fibers, however, will be doing well if they can offset certain serious declines, especially in output of one big cellulosic. Blackest cloud darkening rayon today—evidenced by abrupt sales sags—hangs over rayon

U.S. Production of Cellulosic Fibers: Three Types Going Down, One Shooting Up



tire-cord filament. About 90% of heavy-denier, industrial-use, high-tenacity filament annually has gone into tire cord. This fiber's sales are already down to 320 million lbs./year from the high of around 400 million lbs. in '55; and now is engaged in a life-and-death struggle with nylon tire cord.

Further, it's now held by some industry sources that the original-equipment tire to be selected by Detroit in '61 might well be nylon-cord. If so, these experts feel, at least 50% of high-tenacity rayon's existing market could well be wiped out.

And here's how three other main volume areas of the cellulosic fiber picture look for the next few years, based on a CHEMICAL WEEK survey:

(1) Viscose rayon regular-tenacity filament—the fiber used in lower-priced dress goods, cheaper linings and drapes—dropped off sharply in sales during the past decade. This was due largely to the bad name rayon got during World War II, when basically inexpensive goods were made even cheaper by substitution of 10¢/lb. resin for 33¢/lb. rayon in the suiting, shirting and allied fields. Closing of the Marcus Hook and Roanoke plants of American Viscose, about '53, has helped rebalance the market. This industry is now reportedly operating at 80% of its reduced capacity—about one-half of its peak volume of 300 million lbs./year.

(2) Acetate staple, sparked by Celanese's improved triacetate fiber, Arnel, is reaping the rewards of effective promotion. The company's pricing, selection of applications, and intensive merchandising have resulted in a sold-up position for months in advance. Now ready to make its commercial bow is the newer Arnel 60 (*CW, April 23, p. 71*)—a stronger fiber for lighter fabrics. One nontextile staple use taking up to one-fifth of the acetate fibers' volume: cigarette filters.

(3) Filament acetate has maintained its position in broad woven goods over the past several years, and is now making gains in the apparel field, especially in warp and circular knits. A recent price strengthening would indicate still better days immediately ahead.

New Plants for New Fibers: It's speculated by industry that the last of the big rayon plants ever to be

built in this country went up in the '50s.

Any new plants will be for newer-type modified staple fibers, with industry trying to keep existing regular rayon plants operating somewhere near capacity.

Looking to the newer fibers, Charles Paine, president of Courtaulds (Ala.), says that development in the past two years of two entirely new types of cellulosic fibers, with properties completely different from those of existing rayon, "are likely to result in major expansion of consumption of cellulosics."

Called "high modulus" (or polynosic) fibers and "cross-linked" fibers, these modifications of viscose are more crystalline than old rayon staples, are slated as replacements for combed cotton—an area where rayon previously could not compete. For both types, producers claim water absorbency and swelling properties comparable to those of cotton, good resistance to alkali, and good dimensional stability (*CW, March 21, '59, p. 87*).

Courtaulds' two entries, Corval and Topel, are now going into knit goods, summer suits and blouses.

Most recent entrant in cross-linked fibers: American Viscose's Avlin, a multicellular rayon to be used either 100% or in blends, and now in limited commercial production.

Beside Zantrel in the polynosics market of the '60s will be such fibers as Courtaulds' SM-27 and American Enka's Fiber 500. Both will be used for blending with cotton and hydrophobic fibers; both have excellent resistance to stretching while wet.

And other new fibers are proving themselves better than "rayon": Du Pont's Ondule, North American Rayon's high-strength tow and staples Comiso and Narcon, and American Viscose's Avril, the rayon with cotton-like characteristics that can be Sanforized.

A Plus in Blends: While properties of the new staple are most important, there are other factors that point to a good future:

(1) In blends, rayon is said to eliminate some of the undesirable properties (e.g., static) of synthetic fibers. (It's been termed the perfect low-cost complement to acrylics.)

(2) Up to 40% low-cost rayon can be used in many blends to achieve the same properties provided by use of 35% of a more expensive fiber.

(3) Increased use of rayon, made from wood cellulose, could make valuable acres of cropland—now seeded to cotton—available for production of food for growing population needs.

Courtaulds' Paine says that another goal of researchers in the next few years will be the development of new finishing techniques that could have a "revolutionary effect on demand, even for existing rayon fibers in conventional end-uses."

Rayon makers, however, so far have failed in what they hoped would be one major key to consumer acceptance of the new rayons as "quality goods." They have been unable to get Federal Trade Commission support, under the Textile Products Identification Act, for the idea that the new cross-linked and polynosic fibers deserve their own generic description. FTC has ruled out acceptance of terms such as polynosic, holding that these fibers do not differ radically enough from older fibers to warrant special generic qualification. While Courtaulds, for instance, is challenging FTC's decision in the courts, top industry sources say that it isn't likely the commission will change its mind.

But producers heartily endorse a recent trend toward "performance labeling." New rulings, just out, called American Standards Assn. L22 Textiles, is expected to counteract the "buyer beware" philosophy and to benefit manufacturer, distributor and consumer by discouraging inferior imitations of high-quality fabrics. Tests for 75 end-uses have been set up to assure uniform standards regardless of fiber content. But ASA L22 is said to be only an initial step in the entire revamping of labeling practices that must take place in the next 10 years.

Last-Ditch Fight: While staple producers thus look ahead with confidence, high-tenacity rayon tire-cord makers are making a last-ditch attempt to retain a firm grip on their most vital market. One hard-hit corporation: Industrial Rayon, which this week is starting another set of several hundred layoffs. Chairman H. B. Kline, in outlining the then-proposed merger with Texas Butadiene & Chemical, told stockholders that "competitive nylon has made increasing inroads . . . that new and improved fibers developed to meet this competition have had higher production costs than previously experienced." He added that the two price cuts during the year resulted in "serious deterioration of profits." One more sign of the trend: American Enka, another of the big Tyrex (rayon cord) producers, is stepping up its own nylon production.

Acetates: Eastman says sales of acetate yarns are 5% ahead of last year at this time; from '56 to '59 they increased by 20%. Forecasting steady sales of its products in the '60s, Eastman stresses dyeing and finishing of acetate fabrics as important in their future. Eastman's plan for specification dyeing enables converters to establish their own standards for color fastness. Indications are that more companies each season are adopting Eastman's plan.

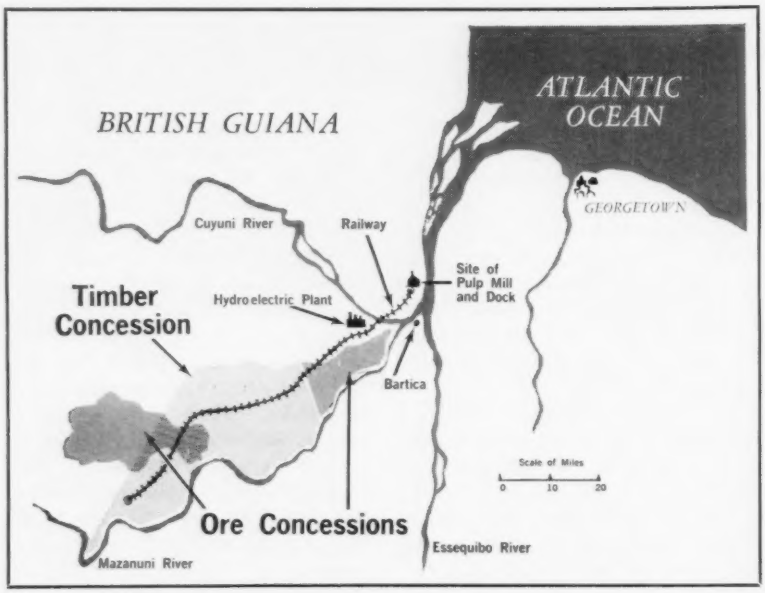
Eastman's director of merchandising, Amos Griffin, tells CHEMICAL WEEK that "the unique qualities of acetate yarns—pleasing, soft hand, drapability, wide range of forms and moderate price—are properties not found in competing fibers." He says that while acetate is not likely to see dramatic surges in the coming decade it can be expected to expand in appropriate applications.

One unknown that could upset the whole cellulosics applecart, however, is imports. Some companies estimate that imports—up sharply since '57—could swallow as much as 50% of the growing market for staple, if the government does not come up with effective import controls.

Another possible upset in coming years: ending of government price supports for cotton.

As Dr. J. L. Bitter, vice-president of marketing, said last week, "All products follow the same general pattern: introductory stage of low volume, low profit; growth stage of sharply rising volume and profits; adjustment stage at which volume continues to climb but profits begin to fall; the mature stage at which volume levels, unit profits continue to drop; and the declining stage in which volume starts falling, profits fall even faster."

Although the cellulosics must now be termed "mature fibers," all indications point to a healthy old age for this pioneering branch of the man-made fibers industry.



From Diamonds to Pulp

The story behind Columbium Corp.'s British Guiana wood pulp mill project, now in the site preparation stage, is an up-from-diamonds saga.

When it starts operation in about two years (actual plant construction won't start for a year), the mill will have a capacity of 250 tons/day of unbleached pulp, 250 tons/day of dissolving pulp, convertible to all dissolving pulp production. Capital for the pulp project will come from a bond issue, now being negotiated with an Italian syndicate. All of the mill's output is expected to be bought by the paper and fiber producers connected with the syndicate.

Site work on the pulp project has been under way only since last August. So far, 400 acres have been cleared, and a 25,000-hp. hydroelectric plant and a 50-mile railroad are under construction. Columbium itself, in fact, set up its executive offices (in New York City) less than two months ago.

But long years of development work preceded this project. Originally, these lands were mineral concessions held by a local group that had been mining gold and diamonds there for some 50 years. Eventually it was discovered that the area's black sands were rich in columbium and tantalum pentoxides; and when the high-temperature metals market began growing in the late '40s, a group of U.S. investors bought up the 119,000-acre mineral concession. When the group finally set up Columbium Corp. in '52, M. W. Ditto, an independent mining engineer with his own international investments, bought in and became president.

Columbium spent the next several years on exploration and development work. One problem that stood out: transportation costs. The ore, dredged deep in the tropical jungle, had to be hauled out by truck and over two sets of rapids by boats that could carry only 5-ton loads.

Moreover, it didn't seem to make much sense to continue burning the thick hardwood timber, which had to be cleared to get at the sands. Last year, after a few years of economic and technical studies on the feasibility of setting up a pulp mill, Columbium won timber rights on about 500,000 acres, partly overlapping the mineral concession. The pulp mill has now become the primary project.

The railroad, which will be amortized by the pulp operation, will make the metal project more feasible. Dredging will be resumed after pulp production starts.

This fall, Columbium will "go public" and float a small stock issue to provide more working capital and pave the way for future expansions in mining, chemicals and metallurgy.

Upjohn: Foreign Push

As a publicly held concern, Upjohn Co. (Kalamazoo, Mich.) seems to be striving for a growth rate even steeper than the more-than-10%/year it averaged when it was family owned.

The company is hiking capital expenditures this year to $20.5 million, all of which will come from internal financing. It is also stepping up research activities; and it's pushing diversification into agricultural and synthetic organic chemicals.

At the annual meeting in Kalamazoo, Mich., and before security analysts in New York, President E. Gifford Upjohn stressed the intention to boost overseas business. Although Upjohn's foreign sales climbed 20% last year, they came to little more than 10% of total volume. In contrast, other ethical-drug companies' foreign sales are 25-30% of total sales.

Upjohn said this year's research budget—topping last year's $15.2-million program—provides for a continuing search for new steroids, antibiotics, and antitumor drugs.

In reply to questions, Upjohn said his company's progestational agent, Provera, "shows great promise in the prevention of miscarriage" but not as an oral contraceptive. He feels two types of oral contraceptives are worth industry's R&D efforts—one to be prescribed on medical grounds in certain individual cases, the other for larger-scale use in nations whose governments want them for relieving population problems.

Building at Beaumont

Goodyear Tire & Rubber—after four months of study—has decided on a site near Beaumont, Tex., for its multimillion-dollar plant for two new synthetic rubbers—Natsyn, from isoprene; Budene, from butadiene (*see also Butylenes Report, p. 67*).

Early this year Goodyear was scrutinizing the Houston Ship Channel area, where it produces styrene copolymer rubber at what it calls "the world's largest synthetic rubber plant" (*CW Business Newsletter, Jan. 23*).

The new plant will be located several miles from Mobil Oil Co.'s Beaumont refinery, which will supply the principal raw materials. Goodyear says construction will begin "immediately," production in mid-'61.

Deeper Chemical Plunge

Archer-Daniels-Midland Co., whose chemical sales already account for a third of its total volume, will soon be plunging deeper into nitrogen chemicals, plasticizers, esters and olefins.

President John Daniels revealed last week that late this summer or early fall ADM will break ground for a $5-million chemical plant at Mapleton, Ill. (six miles from Peoria), on the banks of the Illinois River. The plant site is 200 acres, and ADM holds an option on an additional 100 acres, on which it plans to eventually develop a larger complex.

The new unit will be able to process 50-100 million tons/year of tallows and oils, turn out chemicals with a sales value of 20 million/year. In line with ADM's long-standing no-borrowing policy, the plant will be financed internally.

Fatty Acids First: First products to flow from the new center (due onstream in early '62) will be ADM's line of long-chain fatty acids and glycerides, replacing output of other plants that have become obsolete.

Next will come production of ADM's full line of plasticizers—an increase in total capacity, not replacement of other facilities.

Adding to ADM's over-all capacity will be production of its entire line of primary, secondary, tertiary and quaternary salts of long-chain amines.

And at a later date the plant will turn out a line of epoxy materials—plasticizers and possibly some resins.

Over the years ADM expects the new center to grow substantially. There's a good chance that ADM will produce alkyd resins, glycerides and polyesters; and other ADM divisions, such as its vegetable oils unit, may install new capacity at the site.

Drawn to Chemicals: Although Minneapolis-based ADM is still primarily a processor of agricultural commodities, it has been moving steadily toward chemicals in recent years. Acquisitions and diversifications have taken it into alkyd resins, polyesters and chemically upgraded oils. Heading the company's chemical operations: Executive Vice-President Walter Andrews.

To some extent ADM's work with agricultural products—such as vegetable oils and proteins—has led it naturally into chemicals. Behind this natural branching is the compelling motive of avoiding the erratic ups and downs of agricultural pricing and demand.

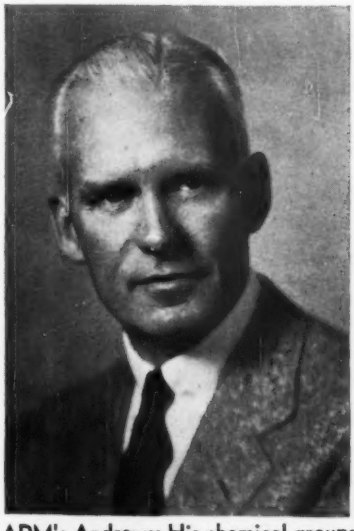
Right now ADM's chemical sales account for 35% of its total sales—which may top $250 million this year. (For comparison, total sales and operating income in the fiscal year ending June 30, '59: $239.4 million.) It doesn't plan to get out of the agricultural product processing business, but future expansions may well boost the chemical share to at least half of ADM's total volume.

New Entries: Meanwhile ADM is readying a passel of new products. Almost ready to go: a water-base exterior coating, keyed to an undisclosed "technical component" that will eventually be made at the new plant. The coating will probably turn up on some '61 autos.

For exterior house painting ADM recently launched an experimental synthetic emulsion, "X-310"—a non-oxidizing vinyl acrylic copolymer.

Another promising product is a polymeric coating for mixed granular fertilizers, designed to permit slow release of the nitrogen-potash-phosphate nutrients.

New Protein Product: ADM is also forging ahead with new developments in its agricultural product line. Now in the commercial development stage: high-protein-content isolated soy protein, an edible product.



ADM's Andrews: His chemical groups aim for 50% of company sales.

Within the past month ADM has launched several new amines, also a bactericidal agent, dimethyl alkyl furfuryl quaternary, for oil and brine well applications.

And it seems a safe bet that ADM will, sooner or later, move into production of starch chemical products. No such move is contemplated right away, but starch research is under way—and the new plant is located right in the heart of the corn country.

Propellant Equation

U-2 overflights plus Khrushchev reaction equal increased international tension and greater concern about military preparedness. This newest equation in "cold war" arithmetic keynotes the quickening tempo of activity in the propellants field.

Late last week General Thomas White—U.S. Air Force chief of staff—called for stepping up the B-70 "chemical bomber" development program that had been virtually abandoned last year. Testifying before the Senate's Defense Appropriations Subcommittee, White also recommended an additional outlay of $350 million for 24 more Atlas intercontinental ballistic missiles and restoration of the Bomarc-B antiaircraft missile program.

Also last week it was learned that four chemical companies' solid-fuel development contracts have been extended by the Advanced Research Projects Agency. These approximately one-year extensions went to Dow Chemical, $2.25 million; American Cyanamid, $1 million; Minnesota Mining and Manufacturing, $1.5 million; and Esso Research and Engineering, $1.5 million.

All of these projects are aimed at developing a solid fuel with about 310 specific impulse—some 10% more than is obtained from present solid fuels. Original contracts were let late in '58 (*CW, Nov. 8, '58, p. 24*).

Also, ARPA has extended Allied Chemical's contract to work on fluorine-based oxidizers (*CW Technology Newsletter, May 2, '59*); and is negotiating with England's Imperial Chemical Industries for a $250,000 contract on solid-propellant development.

COMPANIES

Spencer Chemical Co. (Kansas City, Mo.) plans to acquire all of the assets of Pittsburg & Midway Coal Mining Co. in exchange for about 265,000 shares of Spencer common stock. This move — approved last week by directors of both companies—will next be submitted to their stockholders. P&M has mines in Kentucky, Kansas, Missouri, Colorado and Arkansas. Its net assets—including 37,738 shares of Spencer stock —stood at $20 million last March 31. During the fiscal year ended that date, P&M earned $1.75 million on sales of more than $16 million. Both companies had been headed by the late Kenneth A. Spencer.

•

American Metal Climax (New York) has acquired Pyron Corp. (Niagara Falls, N.Y.) in a cash transaction. This makes AMC a producer of both ferrous and nonferrous metal powders: Pyron produces high-purity, hydrogen-reduced iron powders; and the parent company's AMCO Division produces nonferrous metal powders.

•

Stauffer Chemical Co., which now owns 100% of the stock of Stauffer-Temescal Co. (Richmond, Calif.), reports the company will operate as the Stauffer-Temescal Division of Stauffer Chemical Co. and will continue to be headed by Donald Mastick, former president.

•

Magna-Bond, Inc. (Camden, N.J.) will purchase Delaware Valley Industries (Philadelphia). Magna-Bond manufactures coatings and chemicals; the Philadelphia company produces built-in cleaning systems for home and industry.

•

Precious Metals Refining Corp. has been formed by Sel-Rex Corp. (Nutley, N.J.). The new company will be located adjacent to Sel-Rex's executive offices, will recover precious metals from spent solutions and plated scrap.

EXPANSION

Sodium Hexametaphosphate: Hooker Chemical Co. (Niagara Falls, N.Y.) is building a unit to manufacture sodium hexametaphosphate in the company's Phosphorus Division plant at Jeffersonville, Ind. Construction will start immediately, with completion set for December.

•

Cement: Ideal Cement Co. (Denver) is building its first East Coast plant just outside Wilmington, N.C. Capacity: 1.5 million bbls./year, to be distributed through a center to be built at Fayetteville, N.C.

•

Pharmaceuticals: Strong Cobb Arner Inc. (Cleveland) is doubling manufacturing and laboratory facilities of its Murray Hill, N.J., plant for dry and liquid drug products. Also being added: high-speed packaging equipment. Total costs are estimated at $500,000.

•

Compressed and Liquefied Gases: Union Carbide's Linde Co. Division has taken an option on 367 acres at Clarence, N.Y., one of several sites under consideration for a research and development center, estimated to cost more than $10 million.

Now nearing completion at Torrance, Calif.: Linde's new liquid hydrogen plant to supply the National Aeronautics & Space Administration space and missile programs.

•

Glass Fiber: Ferro Corp. (Cleveland) will start construction of its first Florida glass-fiber plant, in North Miami. Its main customer: the boat industry. Costs and capacity were not disclosed.

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Plasticizers: Tennessee Products and Chemical Corp. (Nashville, Tenn.) is increasing by one-third its production capacity, mainly of Benoflex vinyl plasticizers, at its Chattanooga facility.

•

Polyethylene Film: Mastex Industries, Ltd. (subsidiary of Canadian Industries Ltd.) has begun building a polyethylene film plant at Brampton, Ont. The plant is expected to be in production by September, will convert all types of flexible film.

FOREIGN

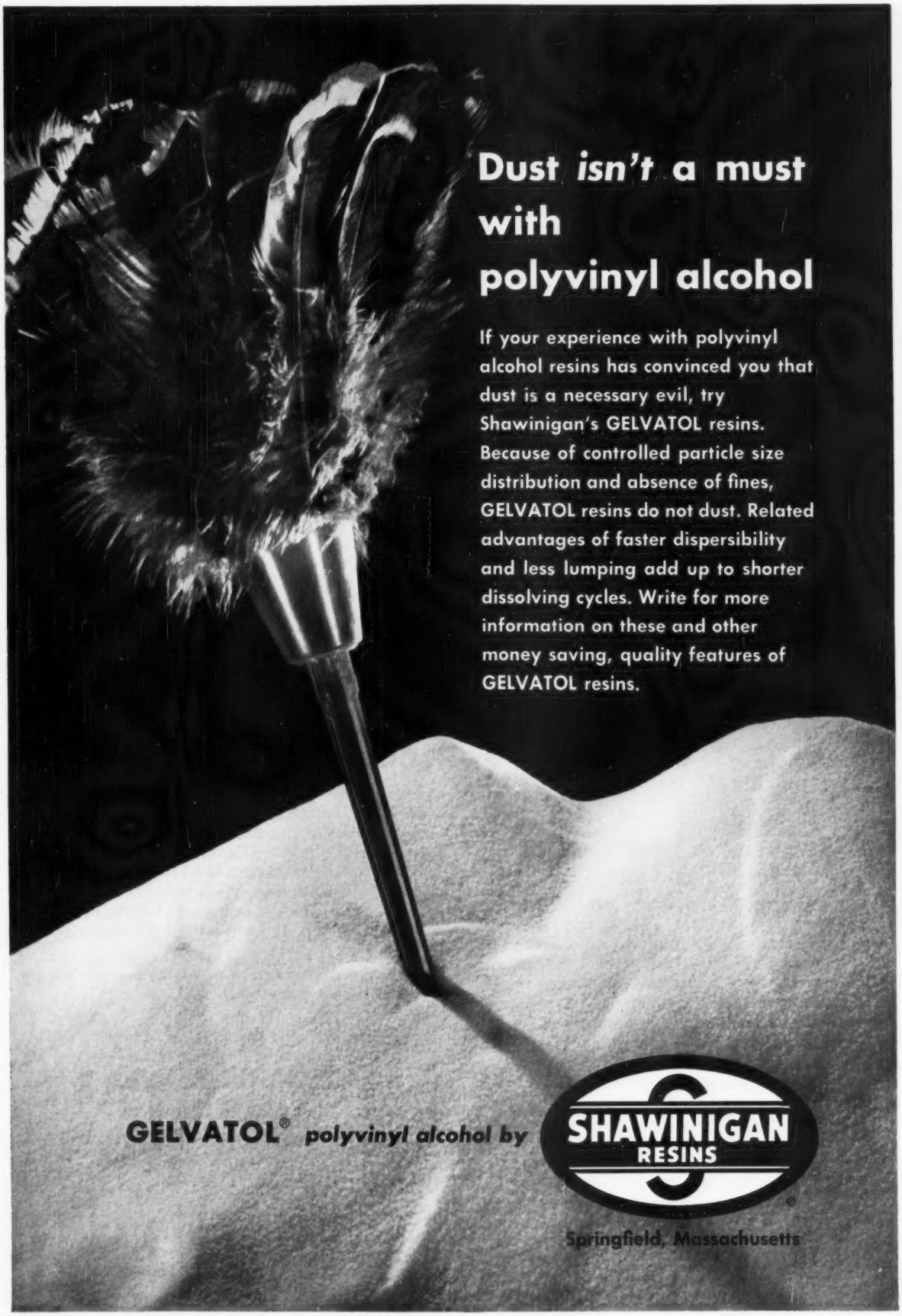
Expansions/Japan: Japan's Ministry of International Trade and Industry last week turned thumbs down on 40% of the petrochemical investments proposed by Japanese producers for '60. MITI rejected applications by more than 100 small producers for projects worth $71 million, approved $118 million worth by the big producers. Other proposed CPI projects were all approved: synthetic fibers, $90 million; oil refining, $147 million; paper and pulp, $143 million.

•

Research/West Germany: Badische Anilin- & Soda-Fabrik will shortly start construction in Ludwigshafen of what it calls Europe's biggest chemical laboratory. Cost: $12 million.

•

Joint Ventures/India: More Indian companies are seeking U.S. partners for chemical projects. M. Nihalchand Abhaya Textile Corp. (Bombay) wants to make phthalic anhydride from naphthalene and titanium dioxide from ilmenite. And Electrical Components Co. seeks partners for plants to make acetic acid, cellulose acetate and other products from rice bran and husks and cotton seeds, waste and lints.


Dust *isn't* a must with polyvinyl alcohol
If your experience with polyvinyl alcohol resins has convinced you that dust is a necessary evil, try Shawinigan's GELVATOL resins. Because of controlled particle size distribution and absence of fines, GELVATOL resins do not dust. Related advantages of faster dispersibility and less lumping add up to shorter dissolving cycles. Write for more information on these and other money saving, quality features of GELVATOL resins.
GELVATOL® polyvinyl alcohol by
SHAWINIGAN RESINS
Springfield, Massachusetts

Trouble-free performance for vinyl gaskets

Vinyls plasticized with PARAPLEX G-54 are exceptionally well suited for many types of gaskets—especially for those on refrigerator and freezer doors, boat windshields, and air-conditioner panels.

Here are some performance properties PARAPLEX G-54 gives to your compounds: (1) Exceptional compatibility between plasticizer and vinyl resin—even at the high plasticizer concentrations required for soft gaskets. (2) Excellent resistance to plasticizer migration into lacquers, baked enamels, polystyrene, and acrylic plastics . . . protects against marring of finishes and crazing of plastics. (3) Low odor. (4) High resistance to plasticizer extraction by soapy water and food oils and greases. (5) Good resilience properties. (6) Exceptional plasticizer compatibility in stocks containing both PARAPLEX G-54 and PARAPLEX G-62. The latter is an epoxy plasticizer frequently used with PARAPLEX G-54 to provide heat and light stabilization.

You'll find PARAPLEX G-54 particularly valuable for compounds requiring exposure to high humidity and elevated temperatures. Under such conditions, vinyls plasticized with PARAPLEX G-54 show good resistance to plasticizer exudation. Write for technical literature on PARAPLEX G-54. Also inquire about our complete line of PARAPLEX and MONOPLEX plasticizers.

PARAPLEX *and* MONOPLEX *are trademarks, Reg. U.S. Pat. Off. and in principal foreign countries.*

Chemicals for Industry

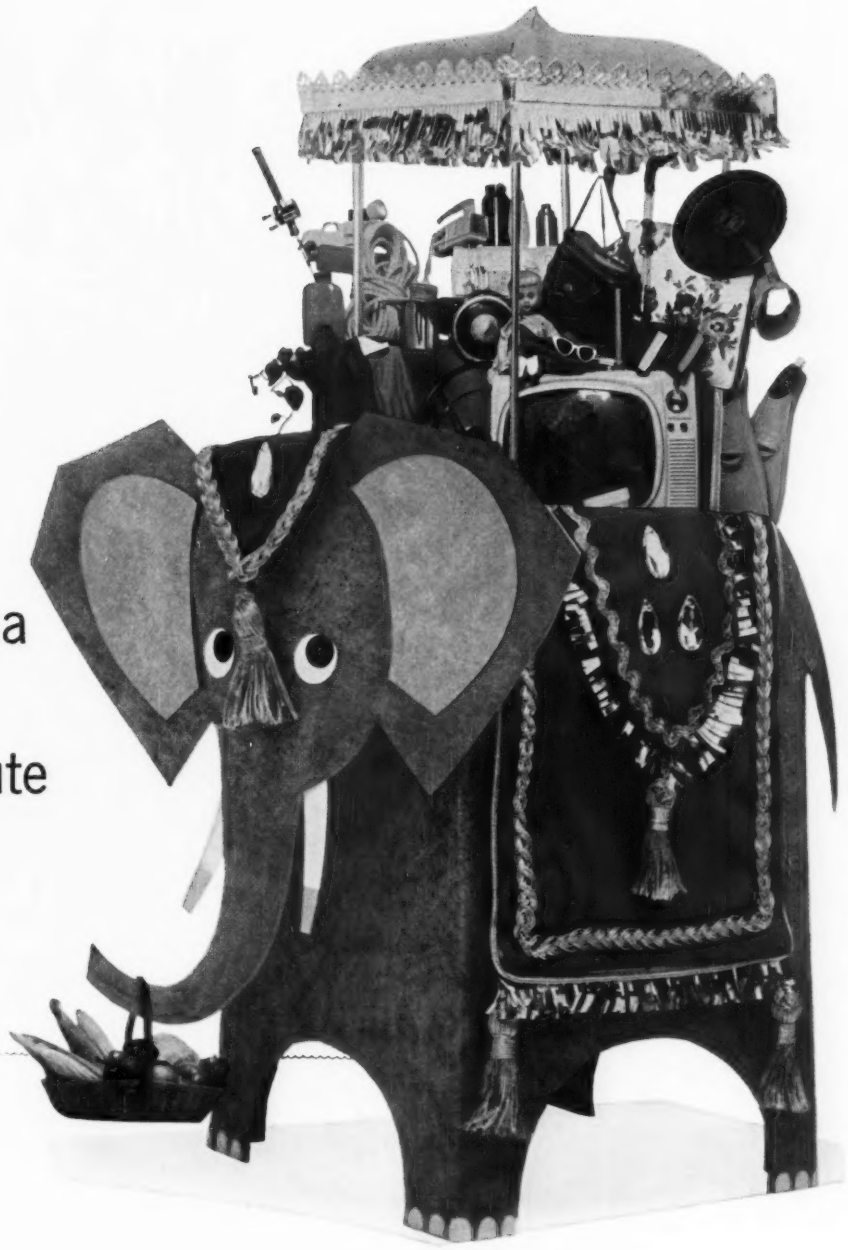
ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

Washington Square, Philadelphia 5, Pa.

PARAPLEX G-54

Vasco da Gama sailed an uncharted route



Vasco da Gama's route to the wealth of the East was uncharted. But when it comes to chemicals, you can steer a sure course to better, more uniform products when you use high quality Sinclair solvents.

Sinclair aromatic, aliphatic and odorless solvents set industry's standards for quality. These Sinclair solvents are available from nearby supply points in the type of transportation equipment you require.

To guard against contamination, Sinclair ships aromatic, aliphatic and odorless solvents in three separate tank car fleets used exclusively for this purpose. For prompt, dependable deliveries, write or call...

SINCLAIR PETROCHEMICALS, INC.

Subsidiary of Sinclair Oil Corporation, 600 Fifth Avenue, New York 20, N.Y.

PARAXYLENE (98%) • PROPYLENE (99+%) • DURENE (1,2,4,5-TETRAMETHYLBENZENE) • ANHYDROUS AMMONIA • AMMONIUM NITRATE SOLUTIONS • AQUA AMMONIA • NITROGEN FERTILIZER SOLUTIONS • ALIPHATIC SOLVENTS • ODORLESS SOLVENTS • AROMATIC SOLVENTS • HEAVY AROMATIC SOLVENT TOLUENE (NITRATION GRADE) • XYLENE (FIVE DEGREE) • SULFUR • SULFONATES (OIL SOLUBLE) • CORROSION INHIBITORS • LUBE OIL ADDITIVES

Sinclair

Plastic-coated glass makes the ideal pressure package

Only Owens-Illinois pressure packages have this bond of plastic to glass

THE PLASTIC IS MORE THAN a jacket around the bottle in an Owens-Illinois pressure package . . . it's bonded to the glass as a part of the container itself. It won't peel off.

This permanent bonding of plastic and glass gives you a tough and handsome package which will never alter your product. For glass is inert to chemicals . . . is flavorless and odorless . . . and keeps what it contains at peak of effectiveness.

These colorful and sturdy Owens-Illinois pressure packages come in a variety of shapes and sizes. Choose from a wealth of stock containers, or let O-I create a new design just for you.

Every O-I container can be permanently decorated with Applied Color Lettering.

DURAGLAS CONTAINERS
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GENERAL OFFICES • TOLEDO 1, OHIO
PACIFIC COAST HEADQUARTERS • SAN FRANCISCO

Washington
Newsletter

CHEMICAL WEEK
May 28, 1960

Exposure of conflicting interests on the part of a Food & Drug Administration official was causing acute embarrassment in Washington this week. The question of how Dr. Henry Welch, chief of the Antibiotics Division, could receive $287,142 in side income during the past eight years without arousing official suspicion was one of the mysteries that remained.

Exposure of Welch's dealing also brought a press conference condemnation of a transaction involving Parke, Davis & Co., which Health, Education & Welfare Secy. Arthur Flemming called "nothing but a gift" by a regulated company to a government official and an "indefensible transaction." Flemming based his statement on admittedly incomplete information made public by the Senate Antitrust Subcommittee.

Parke, Davis Vice-President, Harold Burrows, says Flemming's conclusions "are absolutely at variance with the facts" and were made without consulting the company for information. He denied any company attempt to "compromise or unduly influence a federal employee."

Sen. Estes Kefauver (D., Tenn.) disclosed that Parke, Davis had made a grant of $100,000 in '56 to establish a British edition of "Antibiotic Medicine and Clinical Therapy," one of two journals on which Welch served as editor. The British edition folded after 11 issues, leaving unexpended funds of $37,945, half of which Welch pocketed.

Welch's other outside income, on top of his $17,500 government salary, came from editorship of "Antibiotic Medicine and Clinical Therapy" and "Antibiotics and Chemotherapy," both put out by M.D. Publications Inc. (New York); 7.5% of the net on advertising income of the journals; 50% of the net on sale of reprints (accounting for $173,293); and part ownership of Medical Encyclopedia Inc., a publishing concern.

Income from reprints raised particularly big questions about Welch's dealings. Senator Kefauver pointed out that Welch's official actions in approving or disapproving drugs could directly affect his income from reprints. Articles in the journals by Welch praising certain drugs were bought by the thousands by drug firms and distributed to doctors.

Welch's editorship of the two journals has been discussed in the drug business for years. He had received permission from his superiors to carry out this service on the understanding that he was receiving only an "honorarium" of undisclosed amount. Not until Senator Kefauver subpoenaed the records of M.D. Publications did Welch's superiors learn the real extent of his involvement. Flemming immediately asked for, and got, his resignation.

Before the Kefauver disclosure, however, Welch suffered a heart attack and was granted a disability retirement to become effective June 1, '60. He will not lose his government pension, but Kefauver's

records have been turned over to both the Justice Dept. and the Internal Revenue Service for investigation.

One question the incident raised for the drug industry was whether Welch's financial involvements had influenced his decisions approving or disapproving drugs. FDA Commissioner George Larrick says he is aware of no suspicious cases. He points out that Welch alone could not make decisions, since final clearance had to come from higher officials.

•

Eisenhower's chief argument against increased medical research —that it would draw off too many practicing physicians and cause a more severe doctor shortage—is dismissed by a committee of a dozen leading physicians. The committee, headed by RCA Board Chairman David Sarnoff, points out that while medical research has increased 16-fold since 1940, the number of doctors engaged in it has increased from only 2 to 3%. And research has enabled one physician to treat many more patients.

The committee, appointed to advise the Senate Appropriations Committee, recommends research expenditures of $664 million next year. This compares with $400 million being spent this year and the $455 million figure recently approved by the House.

•

Research on health hazards of new chemicals used in propellants, fuels, coatings, solvents and other military needs will be centered in the Advanced Research Projects Agency (ARPA). Army Chemical Center labs will be primarily responsible for the $500,000 program, with some contracts to be let to private research organizations.

•

New radiation protection standards for all federal agencies have been established by the recently created Federal Radiation Council. They replace standards previously set by each agency for itself. The new standards do not significantly alter the amount of radiation permitted for exposure of radiation workers or the public.

The term "maximum permissible limits" has been dropped in favor of "protection standards" to avoid "confusing" the public. The council says different standards have to be allowed for medical or industrial purposes than for general public exposure.

•

Tempering influence on food additives regulation may stem from recommendations of the President's Science Advisory Committee. The group suggests setting up a board of scientists to advise federal officials in doubtful cases. The board would apply "scientific discretion" to carry out the intent of Congress.

The scientists point out that there is often scientific dispute not only over trace amounts of carcinogens that can be permitted but also what is and what is not a carcinogen.

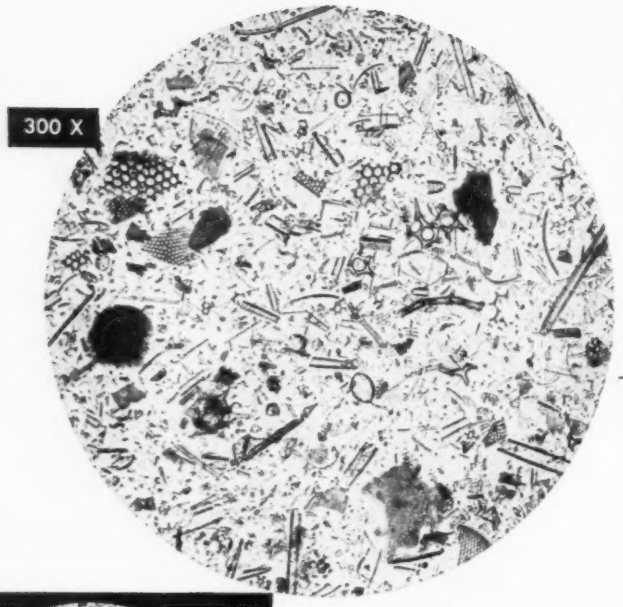
GEM-LIKE QUALITY IN CADMIUM TONERS & LITHOPONES

Brilliant color • Unusually permanent • Excellent heat and light resistance • Exceptionally stable to alkali • Non-bleeding

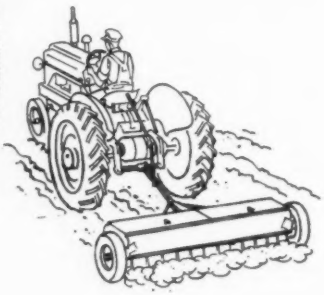
Write today for latest information on cadmium sulfides, selenides and mercury sulfides. Consult our special shade-matching service.

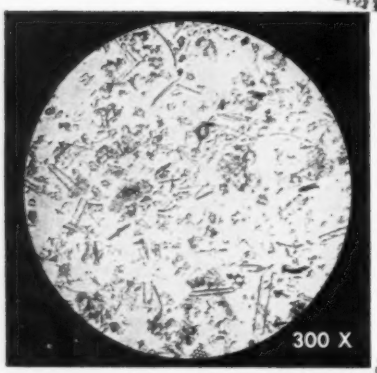
GENERAL COLOR COMPANY

24 Avenue B, Newark 5, New Jersey / Division of H. Kohnstamm & Co., Inc.

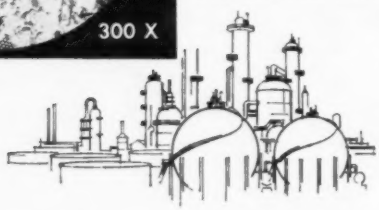


For fertilizer coating—Celite 379, a natural milled diatomite, provides the uniform conditioning needed to prevent caking of granular, mixed or prilled fertilizers—maintains good free-flow characteristics even after prolonged storage.

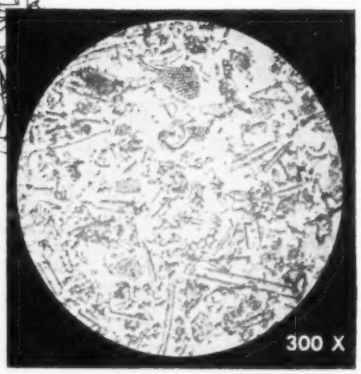




For catalyst carriers—Super Floss, finest particle size flux-calcined Celite grade, is used where a non-reactive porous silica support is needed. (Also available: special Celite supports in many preformed shapes for strength, high temperature stability, resistance to abrasion and attrition.)



As a paint-flatting agent—Celite 281, air-floated fines of flux-calcined diatomite, provides uniform and efficient flatting at low cost. Contributes to control of low angular sheen, durability, and faster drying.



In diatomites, Johns-Manville precision processing works for you

Celite diatomite absorbs its own weight of liquid . . . yet stays 'dry'

No matter which of the many available grades you choose, you can depend on a given volume of inert Celite* to retain its typical dry-powder characteristics even after absorbing its own weight of liquid.

Actually, Celite can absorb a total of more than twice its own weight. That's because a mass of the fine skeletal particles is approximately 93% air space or voids. Yet, in spite of this very high porosity, Celite is essentially non-hygroscopic.

Other unique properties—extremely high bulk, irregular particle shape and large available surface area—ideally suit Celite to hundreds of mineral filler applications. It is produced with precision from the world's purest commercially available diatomite deposit. It offers a wide choice of grades, each carefully controlled for complete uniformity.

For technical data on specific mineral filler or filtration problems, talk to your nearby Celite engineer. Or write to Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

*Celite is Johns-Manville's registered trademark for its diatomaceous silica products

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

Three Key Specialties: How They Fared in '59

Top-Selling Aerosols

in million units

	1958	1959
Hair sprays	92.6	79.7
Shave lathers	45.3	72.6
Coatings	30.1	52.6
Room deodorants	49.8	59.7
Space insecticides	22.3	38.8
Colognes and perfumes	13.6	34.0
Glass cleaners	3.7	18.5
Shoe, leather dressings	5.4	13.7
Waxes, polishes, other household products	—	11.8

Brake Fluids

in million gallons

	1958	1959
Standard and private-label materials meeting SAE light or heavy-duty specifications	9.0	10.3
Other (not meeting SAE specifications, or made to government specifications)	0.7	1.5

Cooling System Chemicals

in million gallons

Nonvolatile antifreeze	94.6	108.3
Volatile antifreeze	10.5	13.2
Cooling system cleaners	4.6 million packages	5.4
Cooling system sealers	12.4 million packages	16.9

Surveys Show Specialties Makers' Strength

A record number of representatives from the chemical industry — over 1,100 — showed up in Chicago last week for the annual midyear meeting of the Chemical Specialties Manufacturers Assn. The surveys of sales for various segments of the industry for last year indicate that specialty manufacturers are doing very well indeed.

Aerosols, for instance, in '59 did 22% better than in the previous year: a total of some 575 million nonfood units were turned out (including 20 million in Canada). At retail this represents sales of about $750 million, according to CSMA officials. Total unit sales reported to CSMA by the 115 reporting companies (a record number) was 498 million; the larger figure includes estimated output of nonreporting companies.

Top performers among the pressurized packages were hair sprays, with 79.7 million reported unit sales; shaving lather, 72.6 million; coatings and/or finishes, 52.6 million; room deodorants, 59.7 million; space insecticides, 38.8 million; colognes and perfumes, 34 million; glass cleaners, 18.5 million; shoe or leather dressings, 13.7 million; waxes and polishes (household and automotive), 11.8 million (*see chart*).

Though still the top item for the aerosol industry (as they have been for the last four years), hair sprays appear to have had a slow year in '59. If sales figures reported to CSMA are accurate, it would indicate an actual decline last year of almost 20 million units. On the other hand, shaving lather climbed substantially over '58, accounted for about 14% of the over-all nonfood total. Room deodorants did 20% better than in '58 and coatings almost doubled their '58 performance. (However, part of this climb can be attributed to companies reporting for the first time.)

As in the past the 6-oz. container was the most popular size of unit for aerosol products. Of the 498.3 million units actually reported, 186.9 million were 6-oz. or smaller units; 155.1 million were in the 6-12-oz. class; and 131 million were in the 12-16-oz. size. Glass containers (all sizes) were used for 25.3 million aerosols.

CSMA's estimate that 575 million units were manufactured for the 125 types of nonfood products turned out in pressurized containers may be close to the actual output. This is substantiated by two related figures: aerosol container manufacturers say they sold 584 million units of all sizes last year and aerosol valve producers say they sold 604 million valves of all types.

A significant figure for aerosol manufacturers is the over-all sales figure of $750 million. In the past, a rule-of-thumb has been to estimate the over-all worth of the market at around $1/can. With the introduction of higher-priced items such as colognes and pharmaceuticals, it's figured that an average of $1.30 is a more realistic figure.

More Antifreeze: It was a good year for antifreeze sales in '59, too. Total gallonage climbed to 121,470,427 gal. from a '58 figure of 110,216,357 gal. Of the '59 sales, 108.3 million gal., 89%, were of ethylene glycol (nonvolatile)-type products, and 13.2 million gal., 10.9%, were of methanol (volatile)-type products.

Cooling System Gains: Automobile cooling system chemicals showed a better rate of gain in '59 than in the previous year. In this category, reports are made in terms of one-treatment packages sold, rather than in bulk quantities. For cooling system cleaners, the '59 figure was 5,444,638 consumer-size packages

sold and 16,951,626 cooling system sealers. Sales of cleaners were split among three major types: dry form, two-phase-type cleaner and neutralizer (1.4 million units) dry form, one-phase (468,932 units) and liquid form (3.5 million units). Over-all, the cleaners showed an increase of about 0.8 million over '58.

Cooling system sealer sales were: liquid form (except block sealers), 11.3 million units; dry form (except block sealers), 3.7 million; heavy-duty and block sealers, 1.9 million units. Approximately 1 million consumer-size packages of liquid cooling system inhibitors were sold, as were about 10.2 million combination water-pump lubricant and rust inhibitor units.

According to the survey, 11.8 million gal. of hydraulic brake fluid was produced in '59. Out of that total, some 10.3 million gal. came under the heading of standard and private-label brands that met SAE specifications. The remainder met government specifications or were different from both of these two commonly accepted standards. This reverses a downtrend. In '58, less than 10 million gal. were produced by U.S. manufacturers, a 5.5% reduction from '57's output.

Butonate Boost

Butonate, the new phosphate insecticide developed by J. E. Casida and W. Arthur at the University of Wisconsin (*CW, May 14, p. 138*), has been licensed to Prentiss Drug & Chemical Co. (New York) for market development. The compound has just received an experimental permit from the U.S. Dept. of Agriculture for extended field tests.

Butonate is 0, 0-dimethyl 2,2,2-trichloro-1-N butyryloxyethyl phosphonate. Prentiss makes it by adding butyric acid to another well-known phosphonate insecticide, Dipterex, a patented compound made by Chemagro (Kansas City, Mo.). Prentiss will sell the compound for about $5/lb., will also sublicense it to others.

A colorless, somewhat oily liquid having a weight of 11.5 lb./gal., it is compatible with most nonalkaline insecticides and fungicides. Its outstanding feature is low mammalian toxicity, said to be due to rapid debutyrylation and phosphate hydrolysis.

Most work with the material has been against household pests such as houseflies and cockroaches. In the agricultural field, it's said to give satisfactory control against the adult pea aphid, the larvae of the Southern army worm, the Mexican bean beetle, and the red spider mite.

PRODUCTS

Fuel Oil Stabilizer: Universal Oil Products Co. (30 Algonquin Rd., Des Plaines, Ill.) has a new low-cost fuel oil additive called Polyflo 120. It is said to be particularly effective for treatment of No. 2 heating oil and diesel fuel derived from a wide range of crude stocks.

•

Economy Can: American Can Co. (New York) introduced a new, cost-saving aerosol container at the chemical specialties makers' show in Chicago last week (*see p. 37*). The new unit, now available in 6-oz. capacity, is soon to be offered in 12-oz. size. Economy of the Snap-Lock can stems from simplified top design, which permits use of a low-cost, single-shell overcap (overcaps are generally needed to make can-stacking possible). The unit can be sealed with a plastic band to prevent tampering.

•

Self-Extinguishing Epoxy: A new, nonburning, self-extinguishing flexible epoxy casting compound, Hysol 15-032, is being launched by Hysol Corp. (Olean, N.Y.). It's a two-component, filled system, is suggested for potting transformers and other electrical parts.

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Multi-use Glue: Wood glueing, paper glueing, and miscellaneous bonding is possible with a new multipurpose industrial glue made by Reichhold Chemicals, Inc. (White Plains, N.Y.). It's tagged 9159 Plyamul, is a white polyvinyl acetate formulation for repackaging.

•

Foam Fighter: Eldefoam 4140, a new aqueous-phase defoamer by Foremost Food & Chemical Co., Eldorado Division (Oakland, Calif.), is designed for pulp and paper operations, is a thick liquid that can be added directly or diluted with water.

•

Polyester Resin: Commercial Resins Corp. (594 James Ave., St. Paul, Minn.) is making commercially avail-

Progress Report...

—2-methyl-1-butanol, commercial
—UCAR butylphenol 4T
—epoxy resins

Streamlined processing—with 2-methyl-1-butanol, commercial

Like almost everything in our modern world, chemical processes can be streamlined, too. In short, you can get faster reactions with fewer side reactions, by-products, and residues.

If your process employs a primary alcohol, you can "streamline" it with CARBIDE's commercial grade of 2-methyl-1-butanol, consisting entirely of five-carbon primary alcohols. Used as an intermediate, this mixture gives quick, complete reactions and highly efficient production. There are no competing side reactions, no by-products, and no un-reacted residues.

Water-white, liquid 2-methyl-1-butanol is a mixture of the branched chain primary amyl alcohols: 2-methyl-1-butanol and 3-methylbutanol-1 with small amounts of pentanol-1. Typical analysis shows 86% by weight of 2-methyl-1-butanol. Boiling point of the mixture is 130° C. and it sets to glass below −90° C. In water at 20° C., it is 2.2% soluble by weight.

While the primary alcohols in amyl mixtures have similar physical and reaction properties, their pharmacological properties are distinctive. Where isomeric contamination is undesirable, the use of 2-methyl-1-butanol permits preparation of products with controlled flavor, odor, and biological characteristics.

The branched-carbon structure of 2-methyl-1-butanol has advantages where solubility, compatibility, and substantivity are important. Its molecular structure is a major factor in lubricants, helping to provide low-temperature pour-points without sacrifice of body at high temperatures. Branched-chain ester plasticizers are faster-solvating and are compatible in a wide variety of systems. In resins, methyl substitution reduces crystallinity. Additives for oils, greases, paints, and other oleaginous materials are more compatible and more soluble when made from such intermediates. **Check the coupon below for a copy of a technical bulletin.**

Now molten UCAR butylphenol 4T available in tank cars

UCAR butylphenol 4T is now being shipped in molten form in both insulated tank cars and tank trucks. This relatively new chemical is also supplied in near-white flake form in 50-pound bags. Its molecular weight is 150.21 and specific gravity is 0.9081 at 114/4° C. Freezing point is 97° C., and boiling point, 236°-238° C. at 760 mm. CARBIDE produces UCAR butylphenol 4T to these specifications: *para*-Tertiary-butylphenol—97 wt. % min.; *ortho*-Tertiary-butylphenol—1 wt. % max.; Di-tertiary-butylphenols—2 wt. % max.

UCAR butylphenol 4T is the starting material in the production of oil-soluble phenolic and modified phenolic resins used for varnishes and lacquers. Combined with appropriate drying oils, the resins give light-colored coatings that are rapid-drying, tough, and resistant to light, water, acids, and alkalies.

UCAR butylphenol 4T is also useful as an intermediate in the manufacture of other products of many types. Among these are antioxidants, waterproof starch finishes and adhesives, pour-point depressors and emulsion breakers for petroleum oils, vinyl ether and dimethylol melamine type plastics, tackifiers and vulcanizers for rubber and curing agents for neoprene adhesives, synthetic lubricants, insecticides, and industrial odorants. For prices and a special Technical Information Bulletin, check the coupon.

Sure cure for epoxy resins

CARBIDE's alkylene amines are effective curing agents or hardeners for both liquid and solid types of epoxy resins. Diethylene triamine, triethylene tetramine, dimethylamino propylamine, and diethylamino propylamine are excellent for room-temperature curing of small masses of resin. These amines are especially suitable when used with resins intended for potting or encapsulating electrical components. The alkylene amines are also used as curing agents in laminating resins.

An interesting new booklet on CARBIDE's epoxy curing agents is now available. For your copy, check the coupon.

Tear out this coupon. Check the boxes on which you'd like more information, and mail to Dept. H, Union Carbide Chemicals Company, 30 East 42nd Street, New York 17, N. Y.

- ☐ 2-methyl-1-butanol, commercial
- ☐ UCAR butylphenol 4T
- ☐ Bulletin F-8665B (Epoxy Resins)
- ☐ 1960 Physical Properties of Synthetic Organic Chemicals—a comprehensive description of the properties and applications of nearly 400 CARBIDE chemicals.

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And remember, at the nearest CARBIDE sales office, you can obtain the services of a Technical Representative backed by Technical Specialists.

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UNION CARBIDE CHEMICALS COMPANY
DIVISION OF
UNION CARBIDE CORPORATION

SPECIALTIES

able a new form of polyester resin for large resin users. CoRezyns 1, 2 and 3 are solid monomer-free forms, can be dissolved in other monomers. The resin is said to be stable indefinitely, until monomer is added.

•

Spicy Product: A new form of dry seasonings, tradenamed Spisoseals, has been developed by Dodge & Olcott, Inc. (New York). The spice seasonings are prepared from natural essential oils and oleoresins, are encapsulated in a protective coating.

•

Top Line Test: Shulton Inc. (New York) is testing in nine markets a new men's toiletries line called Yorktown 1781. A set of shave lotion, cologne and talcum retails for $10. National distribution is set for later this year.

•

Base Coat: Reilly Redhead is the name of a new, bright-red synthetic primer now being marketed by Reilly Tar & Chemical Corp. (Indianapolis). The primer, designed for use in difficult drying and application conditions, is said to develop high initial bond, is quick drying.

•

Pineapple Enzyme: Dole Hawaiian Pineapple Co. (Honolulu) has found a new medical use for bromelain, an enzyme derived from pineapple stumps. The enzyme reportedly cuts the time required for testing blood from two hours to 15 minutes. Other uses: tanning leather, tenderizing meat.

•

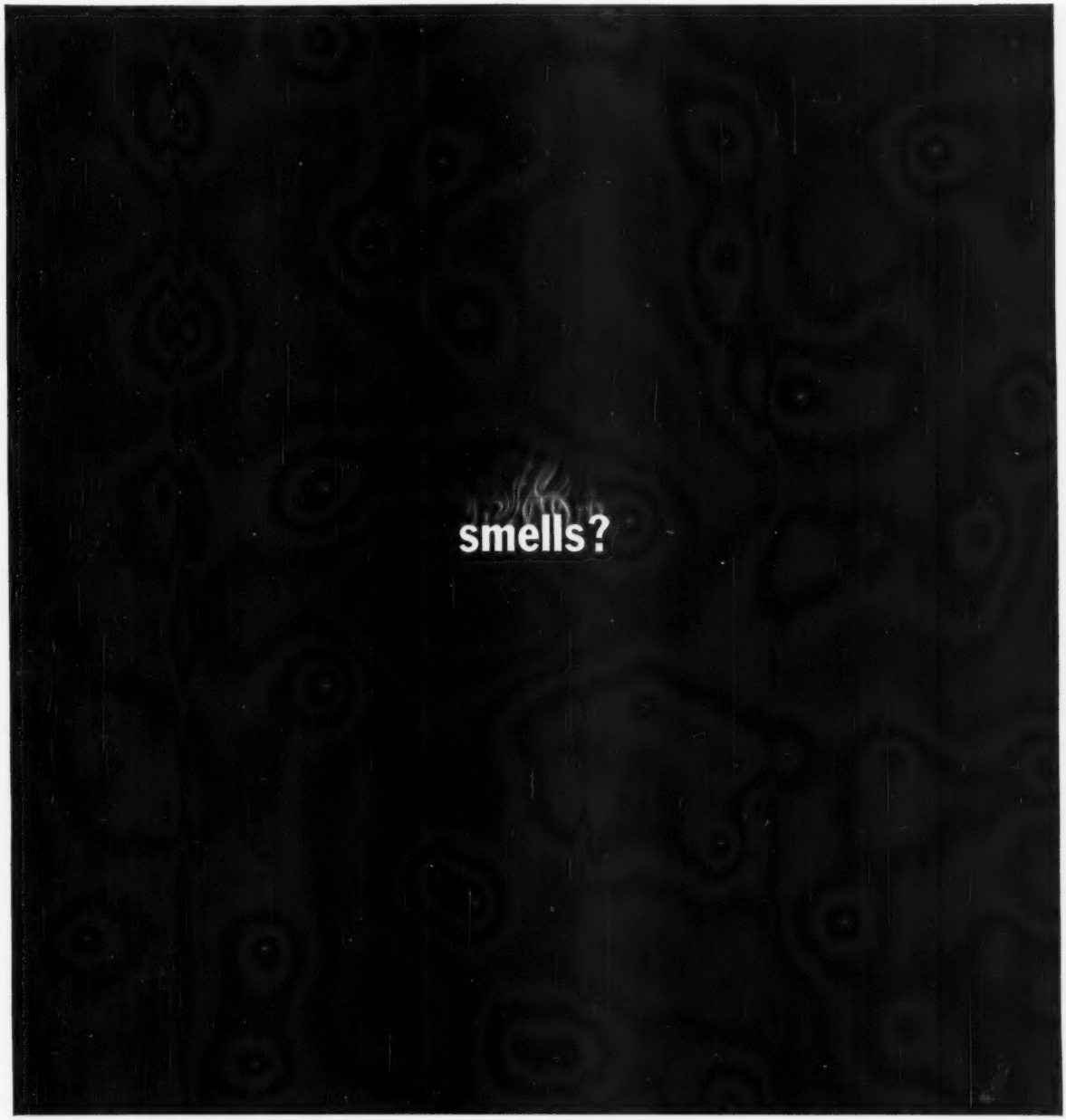
Elmer's Newest: The Borden Chemical Co. (New York) will market another consumer product this year, Elmer's Floor Grip. It's a home-applied rug-backing compound designed to keep scatter rugs from slipping. In a 4-oz. polyethylene squeeze bottle it will retail for 59¢; the 8-oz. size, for $1.

•

Pearls for Plastics: The Mearl Corp. (New York) has introduced Murano Colors, a new synthetic pearl essence, to give a pearly luster to surface coatings and plastics.

•

Phenolic Resin: National Polychemicals, Inc. (Wilmington, Mass.) is now selling Poly-Phen L-118, a phenol formaldehyde resin developed to modify polyvinyl acetate. Highly reactive



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Rhodia Inc. is the world leader in industrial odor control and reodorization technology and a primary producer of industrial aromatic chemicals. It offers fully qualified consultation service anywhere in the United States without cost or obligation.

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Please send me Rhodia literature. My problem is:

(please give specifics)_____

_____

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NAME:_____

ADDRESS:_____

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SPECIALTIES

and water soluble, the resin is said to improve the resistance of polyvinyl acetate to high temperature, water, and a variety of solvents.

•

Cleanup Compounds: Metachem Resins Corp. (530 Wellington Ave., Cranston, R.I., is marketing two new compounds for removing epoxy and polyester resins. Meta-Terge 1405 is a detergent for uncured resins of this type; Meta-Strip 702 is a synergistic noncorrosive solvent for stripping cured epoxy resins. The products are available in both liquid and gel form.

•

Cement Additive: The Dowell Division of Dow Chemical Co. (Tulsa, Okla.) has developed a new fluid-loss control additive for cement. It's called Flac, is said to prevent water in cement slurries from escaping. The product does not react with cement.

•

Coatings Line: A series of new protective coatings that have high chemical, solvent and abrasion resistance is available from Cosden Paint Co. (Beverly, N.J.). The coatings are made of polysulfide liquid polymers and epoxy resins.

•

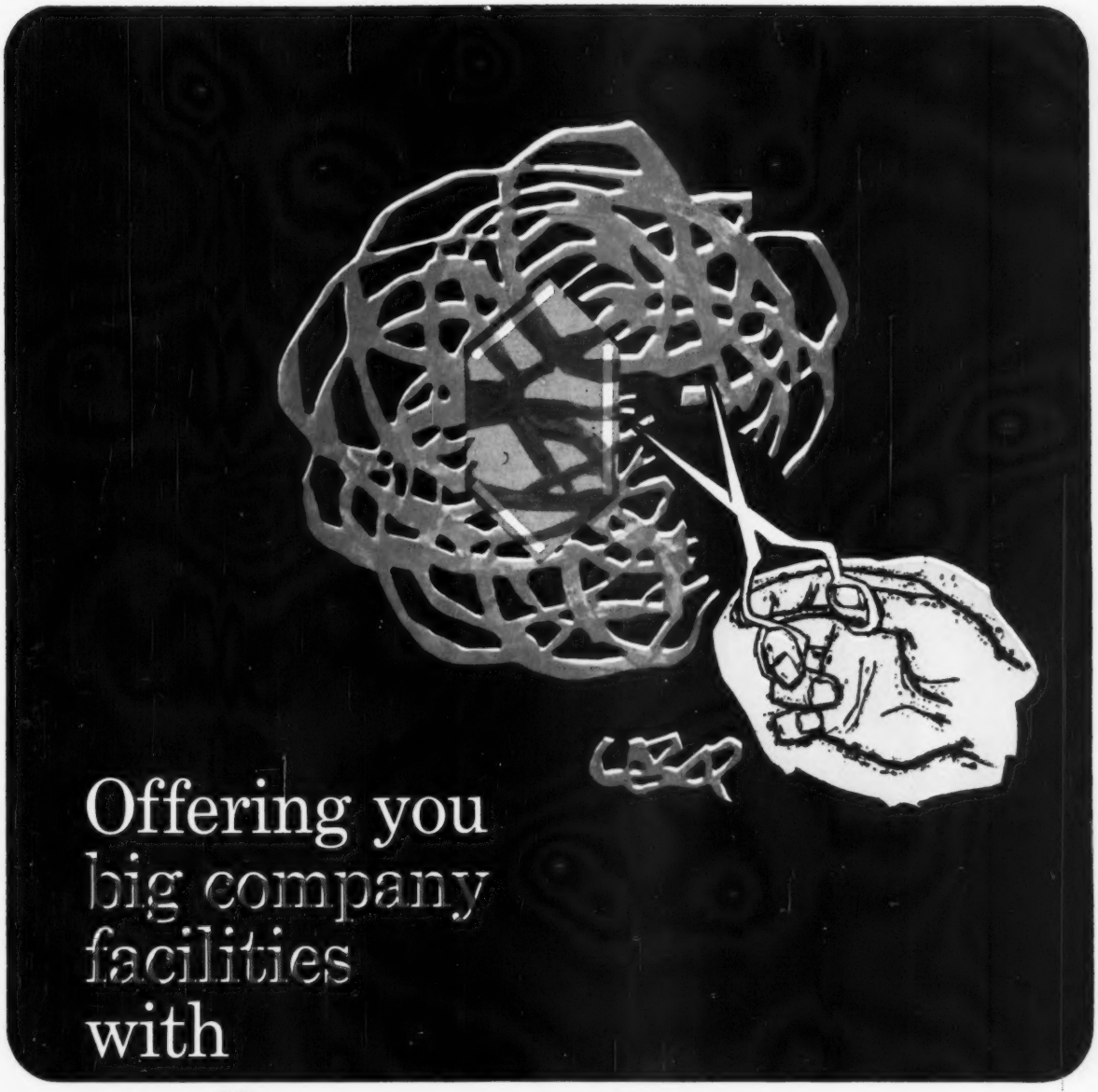
Protective Coatings: Two cold-applied emulsion coatings are now being produced by Koppers Co. (Pittsburgh). One is a heavy-duty protective coating for intermittent immersion in chemicals. It's called Bituplastic No. 33, is said to be the first coal-tar emulsion-type coating suitable for this use. The other coating, Bituplastic No. 44, also has a low permeability rating, is designed as a general-purpose insulation mortar as well as for adhering cellular glass insulating blocks to storage tanks and to underground piping.

•

Nonpermanent Marking Ink: Organic Products Co. (P.O. Box 428, Irving, Tex.) is offering a water-removable marking ink. It's called Water Off Ink, comes in nine colors, sells for $1.75/4-oz. bottle, $16/gal.

•

Aerosol Booklet: Continental Can Co. (New York) is distributing a 28-page booklet, "The Magic of Aerosols," which traces aerosol history, products, markets, containers, and industry services. Also given is a list of contract fillers, propellant and valve manufacturers.



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MOS is a data processing technique that provides the information needed to control your manufacturing cycle. It is designed to handle automatically the decision data required to carry out related functions, from planning and operations control to evaluation. It provides accurate data on a continuing basis . . . in time for effective management decisions.

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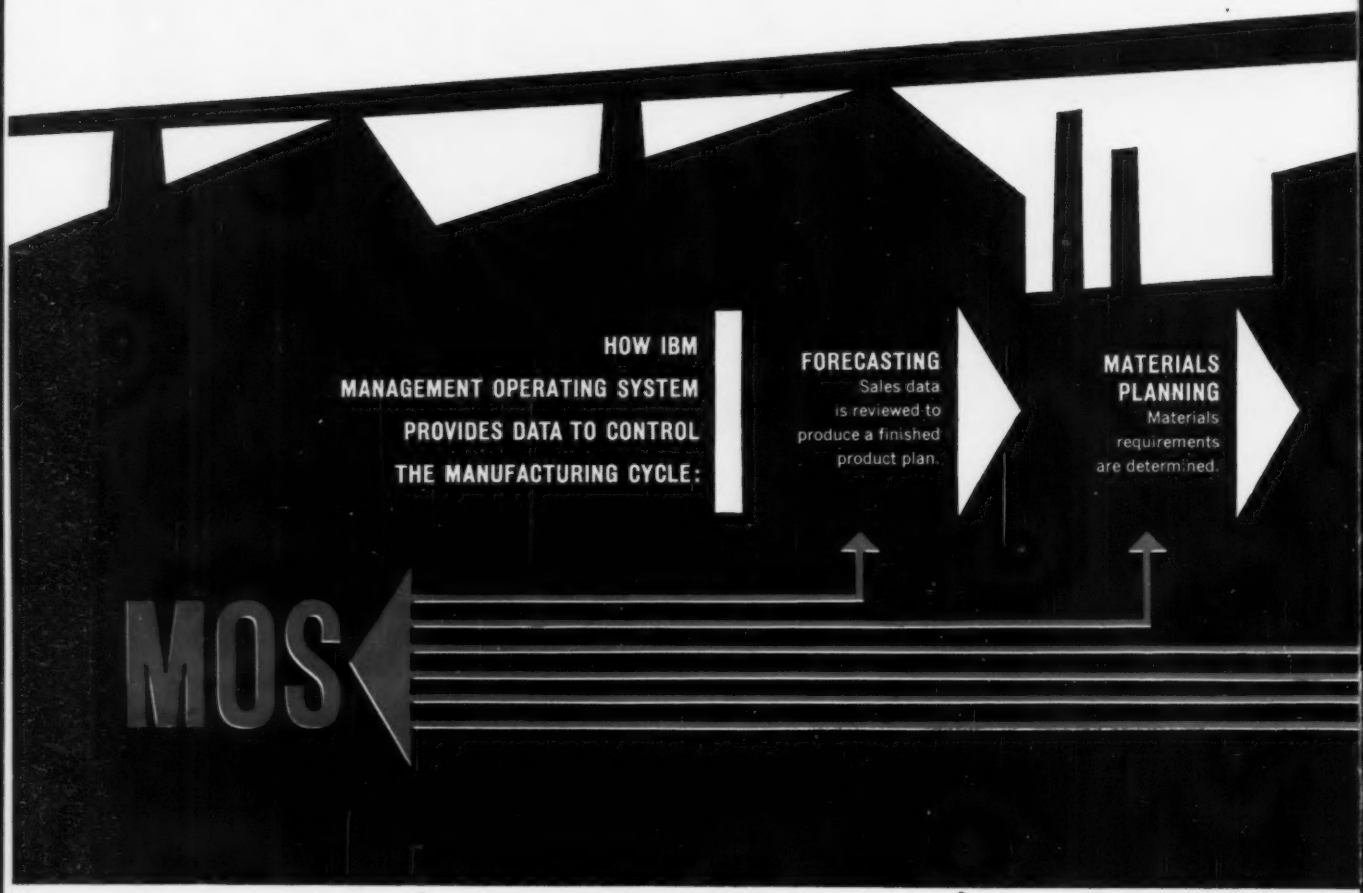


IBM®

BALANCED DATA PROCESSING

What's Right ✓ and Wrong ✗ with These Trademarks?		
PROPOSED NAME	LEGAL VIEW	MARKETING VIEW
BLICK	✓ It's novel	✗ Harsh, unattractive sound
DUXBACK	✗ Suggests a product characteristic, thus hard to protect	✓ Helps explain product benefits
PROTECTOFILM	✓ It's novel	✗ Too long for labels, ads
SOIL-PRUFE	✗ Too descriptive, thus hard to protect	✓ Helps explain product benefits
TORPEL	✓ It's novel	✓ Contains part of company name

Trademarks: Silent Salesmen in New Role

Trademark management, long considered virtually the exclusive domain of corporate legal counsel, is rapidly becoming a vital element of marketing and promotion efforts. For management in general this shift is bringing new trademark policies and new, difficult problems. For chemical process industries management in particular rapid product development and complicated terminology make trademark problems exceedingly hard to solve.

Here are the trends and problems in trademark management—spotlighted at last week's meeting of the U.S. Trademark Assn. in Excelsior, Mo.—as they apply especially to the CPI:

- Conflict between legal and marketing viewpoints over suitability of proposed trademarks and tradenames.
- Rising pressure to develop distinctive trademarks that help sell products.
- Increasing difficulty in selecting novel, distinctive trademarks because of the huge number of registered marks (now over half a million).

What is needed most to improve trademark management, according to experts, is closer coordination between the various corporate functions involved in selecting, using and protecting trademarks — the legal, public relations, marketing and advertising staffs. Until recently this was the legal department's job. But now that marketing and promotional aspects are becoming more important they must be blended with the legal, protectionist viewpoint.

In fact, management is finding that trademarks, if they're really good ones, should be powerful selling tools as well as secure business assets. Moreover, management is discovering that the only way to select a safe, yet distinctive, trademark is by pooling—at the outset—the efforts of all corporate functions concerned.

If a product is slated for overseas sales, the matter is additionally complicated—any proposed trademark must be checked by market researchers for suitability in foreign countries. This means not only making sure it is unique but also determining if it is a "promotable" and acceptable name in the new marketing area.

CPI Representation: To emphasize the need for coordinated trademark management to the nearly 300 representatives of its member companies (many of them CPI firms), the U.S. Trademark Assn. designed its program around a hypothetical chemical marketing situation.

The situation: a small company, Tor Chemical, is developing a new product, needs an effective trademark* to help launch its sales campaign. Previously, the firm produced fire extinguishers and soil repellant materials for industrial use. But now it has developed an aerosol-packaged soil and water repellant formulation suitable for home use.

At the meeting, a series of "top-management conferences" were staged to name the new product.

Chemical process industries representatives occupied the four management positions in these conferences — advertising, marketing, legal and public relations. There also were four representatives of management consulting firms on the panel.

Among participants: B.W.S. Dodge, Gulf Oil Corp.'s advertising director, took the part of Tor's advertising manager; Alden Laufer, assistant market development director of Abbott Laboratories, was the marketing manager; W. G. Reynolds, counsel to Du Pont's advertising, public relations and central research departments, was Tor's legal counsel; William Werner, Procter & Gamble's

*A trademark includes either the symbol that identifies products or the coined brand or product name or both. A tradename refers to the business itself, is synonymous with the company name.

manager of special services, was the public relations manager for Tor. (Keynote speaker at the meeting also was a CPI management man, E. Gifford Upjohn, president of The Upjohn Co.)

Through a series of three conferences, the management of Tor Chemical discussed and debated the relative merits of a raft of likely trademarks. Suggestions: Blick (chosen arbitrarily), Duxback (illustrating the suggestive type of trademark), Stadri and Soil-Prufe (descriptive), Protectofilm and Torpel.

One by one, the management conferences eliminated unappealing names as Tor trademarks. Protectofilm, for example, was rejected by the advertising manager because it was too long to use effectively on labels or in copy. Duxback, Stadri and Soil-Prufe were discarded by legal counsel. Reason: descriptive words are difficult to protect as distinctive trademarks, for competitors could use such phrases as "stays dry" or "soil-proof" without infringing Tor's trademark, yet capitalizing on the goodwill built by Tor's advertising. Blick was vetoed by the marketing manager because of its harsh, unattractive sound.

Thus, Torpel was eventually picked as the brandname for the product. And it had the blessing of all departments involved. They agreed it was novel, probably not difficult to protect from infringement, and a natural for marketing and promotion, since it incorporated the first part of the company name.

Throughout the conferences, participants stressed these sales benefits of a sound, aggressive trademark program:

- Greater sales volume based on residual effects of goodwill.
- Improved relations with distributors and agents resulting from carryover of goodwill to their sales efforts.
- Stepped-up selling efficiency as widespread company knowledge and acceptance paves the way for salesmen, frees them from tiring tactics of "getting in," allows them to concentrate on more important problems.

Chemical Trademarks: Choice of a chemical process company's problems for the USTA's sessions reflects a significant fact—that CPI trademark problems are among the knottiest in U.S. industry.

James Vicary, president of Trademark Management Institute (a U.S. consultant firm offering a range of trademark services), who was on the Tor panel, told CHEMICAL WEEK that the most challenging U.S. trademark problems crop up in pharmaceuticals, chemicals, cosmetics and synthetic fibers. Only in one industry outside the CPI — foods — is there comparable trouble.

There are many reasons for these problems. For one thing, generic names of many CPI products are generally complicated and confusing to consumers.

Consequently, manufacturers must often coin trademarks and product names that are easy to pronounce and remember. And the 500,000 or so U.S.-registered trademarks necessitate extensive searches to ensure trademark novelty.

The rapid-fire development of new products in the CPI—and the resultant extensive use of chemical trademarks and names — make the task still more difficult.

As a result, many CPI firms constantly seek new product names and trademarks. Mechanics of these efforts is quite "primitive," notes Vicary. "Companies should set up a high-level committee to coordinate this activity. If more firms did this, results would be much happier."

Despite the intensive effort required to select, register, promote and protect a trademark, CPI companies have found that over the years it's worthwhile. Some firms have lost valuable trademarks to the public domain through their gradual acceptance and use as generic names for the products they represent. Examples: cellophane, aspirin, mineral oil, milk of magnesia.

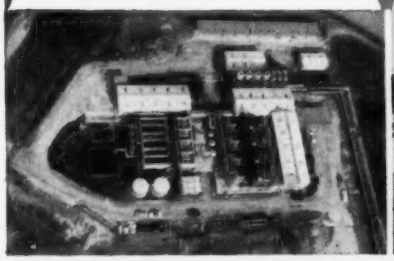
Trademark Prospects: There's little doubt that trademark activity in the years ahead will reach new highs. Last year, for example, trademark registrations by the U.S. Patent Office totaled 18,320, second highest number in any year on record. And corporate title changes by CPI companies last year set a new mark (*CW, Jan. 23, p. 82*).

As competition for markets grows hotter, it's a good bet that CPI companies will count more than ever on teamwork among marketing, promotion and legal management to pick trademarks that will give their products a sales edge in the marketplace.

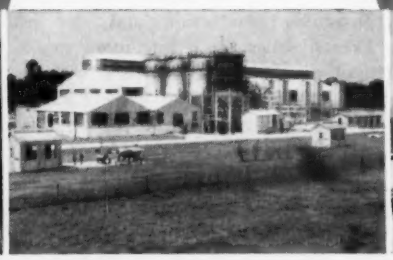
SULPHUR

6 POINTS OF DEPARTURE

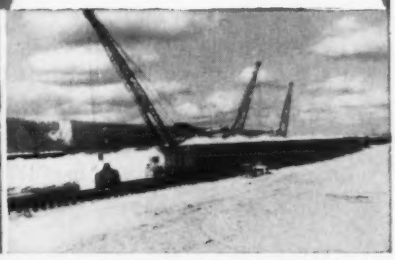
FANNETT, TEXAS



MOSS BLUFF, TEXAS

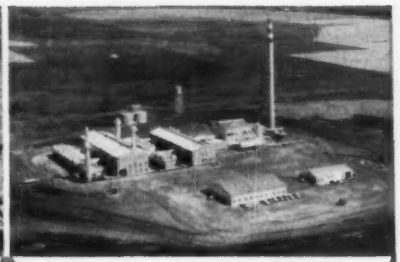


NEWGULF, TEXAS



SPINDLETOP, TEXAS

WORLAND, WYOMING



OKOTOKS, ALBERTA

Solid or Molten Sulphur to all users in the United States and Canada

In addition to these six producing properties, stocking and distribution centers are being set up, thus broadening the TGS Service to industry. Ample supplies of both molten and solid sulphur will be available at these centers. Cincinnati, the first of these units, is now in full operation.

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Four Likely Results of New French Drug Laws

1. *Tighter rules on drug production and sale*
2. *Speedier handling of "visa" applications*
3. *Better product protection through drug patents*
4. *Tougher sledding for marginal operators*

French Tighten Drug Rules

The French drug industry is in near-turmoil this week, as the date nears for a major shuffle in regulatory legislation. The new drug law, which takes effect next week (June 1), tightens and streamlines regulations governing production and sale of French drugs. In a few more weeks another closely related law will go into effect, setting up a drug patent system, first in France in over a century.

For U.S. pharmaceutical companies, the new laws promise greater protection from drug pirating, a problem that has long worried them.

Moreover, stricter controls and inspections may crimp some marginal producers, set the stage for consolidations among some of the smaller firms, according to Droit et Pharmacie, international drug consultant firm. At the same time, streamlining of regulatory procedures may also break up the log jam of new-drug applications now awaiting official approval.

Outmoded Laws: The new law is designed to alleviate several serious problems that have plagued the French drug industry since the mid-'40s. For one thing, the regulatory procedure now being enforced by the Ministry of Health has several glaring loopholes in it, has allowed drugs to be sold that resulted in deaths.

Moreover, the government's various inspections and examinations proved to be so cumbersome that companies' marketing programs were stalled for years while they awaited final approval of their products.

Lack of patent protection for new-drug developments has stymied research and product development, too. That's because French law for over a century (1844) has prohibited the patenting of pharmaceutical products.

Plugging the Loopholes: When the first new law takes effect, drug producers will need two different government approvals before they can manufacture and sell pharmaceuticals.

One of these "visas" or permits will pertain to the drug itself and to its formula and properties. In addition to the current requirements for data on therapeutic value and tolerances, manufacturers will be required to submit test data verifying the formula through qualitative and quantitative analyses.

The other visa concerns the fitness and adequacy of the manufacturing operation to turn out safe drugs. This approval will be required before marketing can begin.

Besides closing some of the loopholes in previous legislation, the new regulations are also designed to simplify the inspection process, speed the availability of new drugs. Reason: drug producers will now have to show only that a drug is beneficial to health. Formerly, they were held responsible for proving that their product was new or represented a new use.

Patents Enter: But probably the most significant aspect of the changing laws is the institution of a drug patent system. Although this provision resulted from the same government action that created the other reform measures, it will not take effect until mid-June. That's because the regulations require an official government decree before they become effective, and the de Gaulle government is expected to implement the patent provision shortly.

SALES

DATA DIGEST

• **Acrylonitrile:** New, 16-page booklet describes the properties, uses, organic reactions and handling procedures for acrylonitrile. Two-color wall chart shows reactions and derivatives of acrylonitrile and various organic compounds. Cyanoethylation, olefinic and nitrile reactions are described; also given is a list of potential uses for acrylonitrile derivatives such as acrylic acid, acrylamide, various other nitriles and amines. Plastics Division, Monsanto Chemical Co. (Springfield, Mass.).

• **Liquid Silicone Rubber:** Brochure discusses applications of liquid, room-temperature-curing silicone rubber. Typical uses: compound for sealing, coating, impregnating and bonding of aircraft and missile parts. Silicone Products Dept., General Electric Co. (Waterford, N.Y.).

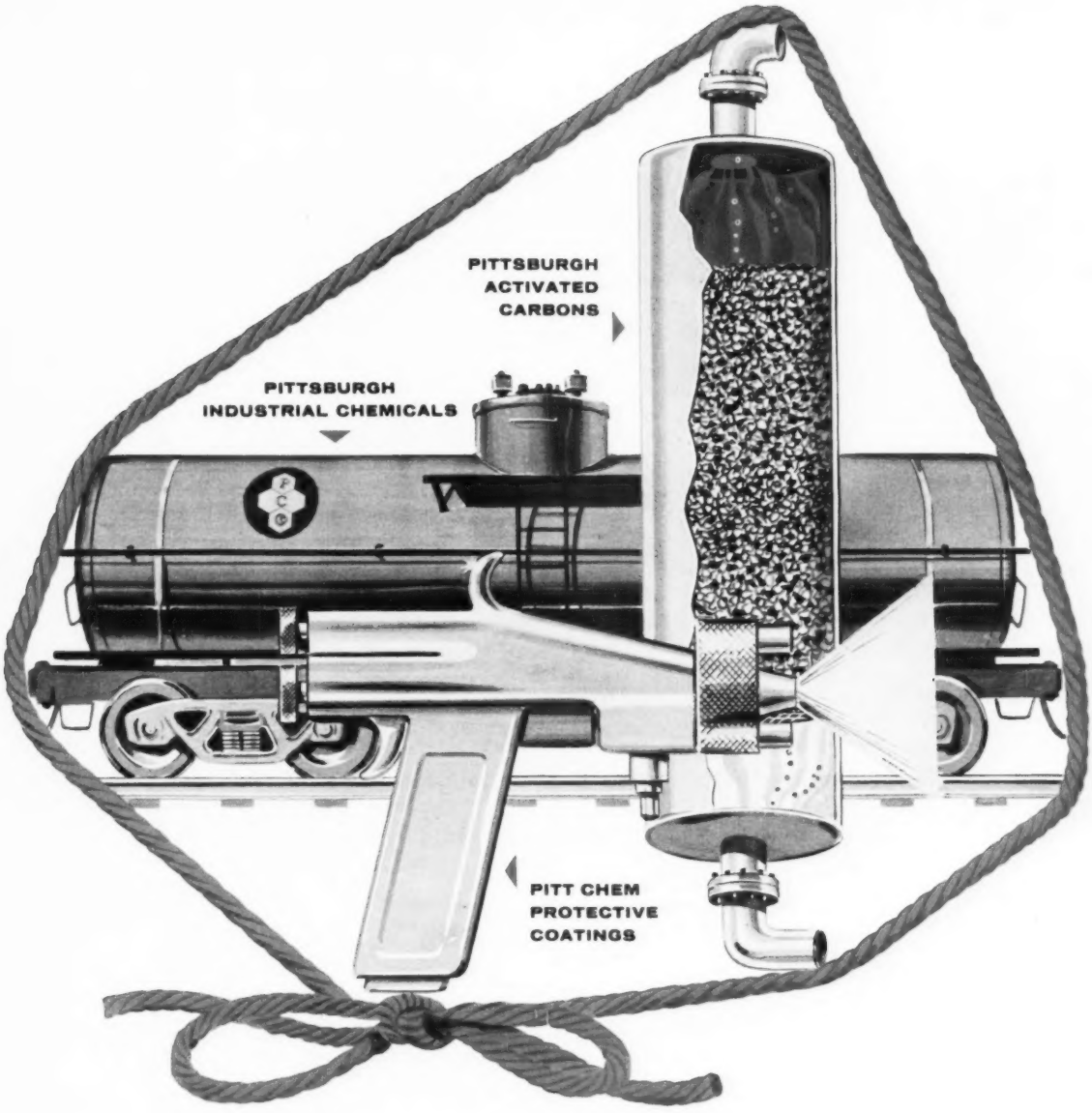
• **Aldehyde Safety Data:** Two new safety data sheets provide detailed information on properties, hazards, waste disposal, first aid and fire-fighting methods for butyraldehydes (SD-78), and formaldehyde (SD-1). Manufacturing Chemists' Assn. (1825 Connecticut Ave. N.W., Washington 9, D.C.).

• **Plastics Blow Molding:** Bulletin (number 105) presents basic information on the principles and methods of blow molding plastic materials. Polymer Chemicals Division, W. R. Grace & Co. (225 Allwood Rd., Clifton, N.J.).

• **Light Absorber:** Folder discusses specifications and possible uses of a new light absorber, Cyasorb UV 314, suitable for light-stabilizing polyolefin plastics. Possible applications: polyethylene or polypropylene fibers for outdoor furniture fabrics and marine ropes. Film and sheeting of these resins can be used for greenhouse "windows," tarpaulins, high-altitude balloons, irrigation tubes and silos. Intermediates Dept., American Cyanamid Co. (Bound Brook, N.J.).

• **Organic Chemicals:** Catalog lists organic chemicals available from National Aniline Division, Allied Chemical Corp. (New York).

• **Carbon Materials:** Brochure describes carbon blacks, carbon cokes, petroleum cokes and briquettes produced by Wilson Petrolcoke & Carbon Corp. (500 Fifth Ave., New York 36).



Three experienced organizations now tied together under a new name...

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Grant Building Pittsburgh 19, Pa.

A Subsidiary of Pittsburgh Coke & Chemical Company

PITTSBURGH CHEMICAL COMPANY

Pittsburgh Chemical Company is a basic producer of industrial chemicals, activated carbons and protective coatings. Today, as in the past (when you may have purchased these materials from the former divisions of Pittsburgh Coke & Chemical Company) our basic position is your assurance of high purity products, delivered to your production schedule, regardless of market conditions or the size of your order.

As an autonomously operating subsidiary, concentrating in chemicals and chemical products, our new organization is able to offer you these additional reasons for relying on Pittsburgh. A planned program for expansion of our production and marketing facilities is moving ahead rapidly. And today we're in a better position than ever to offer you alert, personalized sales service and practical technical assistance in the more efficient application of Pittsburgh products in your plant. Our entire organization is geared to a single objective—to help you produce a *better* product at a *lower* cost.

For additional information on any of the products listed below write, wire or phone us by our new name—Pittsburgh Chemical Co.

INDUSTRIAL CHEMICALS DIVISION

A broad line of coal-derived industrial chemicals and chemical specialties for the chemical, plastics, paint, pharmaceutical and process industries.

	PRODUCT	DESCRIPTION	USES
INTERMEDIATES	**PHTHALIC ANHYDRIDE**	**Specifications:** Color (Molten), Hazen ..... max. 55 Solidification Point ..... min. 131°C White flakes; sediment free.	Manufacture of alkyd resins, plasticizers, dye intermediates, and other organic chemicals.
	MALEIC ANHYDRIDE	**Specifications:** Color (Molten), Hazen ..... max. 20 Solidification Point ..... min. 52.5°C Assay ..... min. 99.5%	Polyester resins, alkyd resins, vinyl resins, rosin modified resins, drying oils, dyestuffs, pharmaceuticals, textile chemicals, synthetic tanning agents.
	FUMARIC ACID	**Specifications:** Assay as Fumaric Acid ..... min. 99.5% Maleic Acid ..... max. 0.1% Ash ..... max. 0.02%	Polyester resins, alkyds, rosin esters, modified phenolics, pentaerythritol esters.
TAR ACIDS	**PHENOL**	39°C—Min. phenol content ..... 97% 95%—Min. phenol content ..... 95% 90-92%—Min. phenol content ..... 90% 82-84%—Min. phenol content 82%	**Manufacture of plastics and resins, adhesives, dye intermediates and herbicides. Lubricating oil refining.**
	ORTHO CRESOL	**25-28°C Ortho Cresol** Solidification Point, wet ..... min. 25°C Assay ..... min. 86% Distillation Range (inc. 191°C) ..... max. 5°C **30°C Ortho Cresol** Solidification Point, wet ..... min. 30°C Assay ..... min. 97% Distillation Range 5-95% (inc. 191°C) ..... max. 2°C	**Manufacture of plastics, resins, and insecticides. Refining of lubricating oils.**
	META PARA CRESOL	**3°C Meta Para Cresol** Distillation Range 3°C, 5-95% .... 200-204°C Sp. Gr. (15.5/15.5°C) ..... 1.030-1.040 **12°C Meta Para Cresol** Distillation Range 10°C, 5-95% ... 200-210°C Sp. Gr. (15.5/15.5°C) 1.031-1.041	**Manufacture of plastics, resins and plasticizers.**
	XYLENOL	**Light brown to a red clear liquid containing the various Xylenols, some Cresols, and higher boiling tar acids. Various grades available.**	**Manufacture of synthetic resins, adhesives and germicides.**
TAR BASES	**PYRIDINE**	**2°C Pyridine** Water white liquid with strong odor. Purity ..... min. 98% Distillation Range 2°C max. ..... 114° to 117°C Sp. Gr. (15.5/15.5°C) ..... 0.983-0.989 Also 10°, 15°, and 20° pyridine bases.	Manufacture of pharmaceuticals, dyestuffs, rubber chemicals and water repellents. Extremely versatile solvent, acid acceptor and catalyst.
	ALPHA PICOLINE	**2°C Alpha Picoline** Colorless liquid with strong odor. Soluble in water and most organic solvents. Distillation Range 2°C max. 127.5° to 130.5°C	Manufacture of pharmaceuticals, dyestuffs and rubber chemicals. Solvent in various processes.
	REFINED MIXED PICOLINES	**Refined Mixed Picolines** Colorless liquid with strong odor. Soluble in water and most organic solvents. Distillation Range 3°C max. ..... 140° to 145°C	Manufacture of vitamins, pharmaceuticals, textile waterproofing agents and textile specialties.

	PRODUCT	DESCRIPTION	USES
INORGANICS	**SULPHURIC ACID**	**66° Bé Sulphuric** 66° Baume ..... min. 93.2% H_2SO_4 Sp. Gr. (15.5/15.5°C) ..... min. 1.835	Pickling and cleaning metals. Manufacture of fertilizers, textiles, organic and inorganic chemicals. Processing of leather, textiles and petroleum.
	OLEUM	**20% Oleum** Free SO_3 ..... min. 20% Assay H_2SO_4 ..... min. 104.5% Sp. Gr. (15.5/15.5°C) ..... min. 1.916	Sulfonation of organic compounds; component for nitration of organic compounds.
PLASTICIZERS	**PHTHALATE ESTERS**	A broad range of phthalate plasticizers produced from our own phthalic anhydride to provide an excellent balance of desirable performance characteristics. Includes a number of combinations of the following alcohols: octyl, isooctyl, isodecyl, butyl, tridecyl, n-octyl n-decyl.	**Primary plasticizers for polyvinyl chloride compounds including vinyl film and sheeting, coated fabrics, flooring, wire jacketing, extrusions, plastisols, etc.**
	ADIPATE ESTERS	Adipate plasticizers provide low temperature flexibility, viscosity stability. Available as esters of n-octyl n-decyl, isooctyl, and 2 ethylhexyl alcohol.	**Calendering film, sheeting, vinyl dispersions, extrusions.**
	SEBACATE ESTERS	Sebacates impart extreme low temperature flexibility, low volatility and low water extraction. Available as esters of butyl and octyl alcohols.	**Vinyl film, oil resistant rubber compounds, cellulosic derivatives and oil resistant synthetic rubbers.**
	EPOXY PLASTICIZERS	Epoxidized soy bean oil and octyl epoxy tallate plasticizers and stabilizing polyvinyl chloride resins.	**Provides excellent heat and light stability to vinyl formulations.**
	TRICRESYL PHOSPHATE	Provides flame retardancy and imparts excellent permanence and volatility properties.	**Vinyl film sheeting, and electrical insulation.**
SPECIALTY PRODUCTS	**PHTHALOCYANINES**	Blue Base B4E, Blue Presscake B1C, BNC, Green Presscake G1S, Green Presscake G1B, Green Dispersed Paste G2S, Green Toner G3S.	Pittsburgh Phthalocyanines are used in the coloring of printing inks, paints, rubber, plastics and textiles.

ACTIVATED CARBON DIVISION

Coal-derived Pittsburgh Activated Carbons possess a rigidly controlled pore structure which results in exceptional adsorption qualities. In purification, decolorization, catalysis, recovery or refining of a liquid or a gas, Pittsburgh Granular Activated Carbons, in a continuous column system, perform the job more efficiently and economically than any other material available.

Pittsburgh Granular Carbons for Liquid Phase Applications

Product	U.S. Sieve Series	Uses
TYPE SGL	**8 x 30**	Corn sugar refining for the purification and decolorization of corn starch hydrolysate liquors.
TYPE CAL	**12 x 40**	Cane sugar refining, where liquors of exceptionally low color and high purity must be produced.
TYPE OL	**20 x 50**	Purification and decolorization of sodium acetate, benzoic acid, plating baths, caustic liquors, mineral acids, etc.
TYPE GW	**10 x 30**	Purification of industrial and municipal water supplies.

Pittsburgh Granular Carbons for Vapor Phase Applications

Product	U.S. Sieve Series	Uses
TYPE BPL	**4 x 10** **6 x 16** **12 x 30**	Vapor adsorption field, typical of which is the solvent recovery system. Used as catalyst support in acetylene process for production of vinyl monomers. Also used in the removal of organic sulfur compounds and other contaminants from gas streams.

Pittsburgh Pulverized Carbons for Liquid Phase Applications

Product	U.S. Sieve Series	Uses
TYPE RB **TYPE RC**	**75 to 85%** **−325**	Where a granular system is not feasible, Pittsburgh offers two highly active pulverized carbons for use in decolorization, purification and isolation of numerous chemical, pharmaceutical and food products.

PROTECTIVE COATINGS DIVISION

Provides a comprehensive family of heavy-duty coal tar and Gilsonite-asphalt coatings compounded for the chemical, marine, petroleum, water and sewage, pulp and paper and general plant maintenance fields. Also supplies industry with a number of specialty products.

PITT CHEM TARMASTIC® SERIES AND TARSET®

PRODUCT	DESCRIPTION	USES
TARMASTIC 101	A heavy-duty coal tar coating that withstands severe corrosion.	Protection of metal, masonry, stone and brick against corrosive vapors, acid and alkali spillage and moisture.
TARMASTIC 102	A thin, high gloss coal tar coating for general maintenance purposes.	Protects fencing, stored pipe, window sash against mild corrosion. An excellent vehicle for aluminum paint.
TARMASTIC 103	A coal tar coating for surfaces exposed to corrosive vapors, dilute acids and alkalis.	General maintenance of structural steel and concrete.
TARMASTIC 104	An approved coal tar coating designed to protect potable water systems.	Used to protect tanks, interiors and exteriors and pipe interiors carrying or storing potable water.
TARMASTIC 105	Flexible water vehicle coal tar coating for protection against weather, industrial and refinery corrosion.	Effective protection against aliphatics. Driveway sealer. Fire retardant roof coating.
TARMASTIC 106	A coal tar coating to protect surfaces against moisture, seepage and rust.	Protects concrete pads for tank and silo bottoms. Flashing cement for metal roofs.
TARMASTIC 107	A coal tar water vapor barrier coating for pipe and general industrial needs.	Repair cement on oil and gas transmission lines. Pipe joints and pipeline river-weights.
TARSET®	Patented coal tar-epoxy resin coating, that withstands high temperatures, extreme corrosion. Two component (catalytic-setting) coating system. Patent No. 2,765,288.	Extremely resistant to chemical corrosion attack. Protection of metal and concrete surfaces above and below ground from severest corrosive conditions.

PITT CHEM INSUL-MASTIC®—VAPOR SEAL AND INSULATING MASTICS®

PRODUCT	DESCRIPTION	USES
INSUL-MASTIC 4010 SERIES	Universal, heavy-duty Gilsonite-asphalt vapor-seal coatings designed to protect surfaces against atmospheric corrosion, and corrosive vapors.	Industrial plant maintenance, weather and moisture barrier in marine atmospheres, as a vapor-seal barrier over block type insulation, for moisture control.
INSUL-MASTIC 553 SERIES	Cork-impregnated heavy-duty insulating mastics. Provide up to 65% heat retention. Require no mechanical attachment. Provide insulation, prevent corrosion.	Thermal insulation, condensation control, sound deadening.
INSUL-MASTIC MICA MASTICS	Heavy, resilient protective coating of mastic consistency. Contains 15 to 25% flake mica.	Protection of building and home exteriors from moisture penetration. Beautifies and insulates by reflection of solar radiation.
INSUL-MASTIC SPECIALTY PRODUCTS	Caulking compounds, mastics, primers, cork mastics, paints.	Caulking, roofing, railroad coatings, undercoatings, color top coats, etc.

OTHER PITT CHEM PRODUCTS

PITT CHEM COAL TAR PIPELINE ENAMELS—protect thousands of miles of underground oil and gas transmission lines throughout the United States.

COAL TAR for road tar and rubber blends.

CREOSOTE for wood preservatives and insecticides.

COAL TAR PITCH for electrodes, coating and roofing manufacture.

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PCCo. INT. 1

LITHO IN U.S.A.

No one steals a reactor.
But many more-modest items
regularly move
through plant gates.

Is Pilferage Robbing You of Profits?

This year chemical industry employees will walk off with an estimated $100-125 million in plant equipment, tools and products. And today the problem is becoming more acute. The changing character of the modern chemical plant is increasing the theft potential, giving new urgency to the need for re-evaluating security programs.

Free time for operators—a prime ingredient for pilferage—is being created in many instances as batch processes are replaced with automated ones. Maintenance, which is taking a greater share of the labor force than ever before (*CW, Jan. 23, p. 59*), increases the amount of free movement around the plant, puts into the hands of more workers tools that are easily carried off.

And plant expansions are moving more small companies into the medium-size category—the group that suffers the most pilferage—according to Nicholas Prounis of Norman Jaspan Associates, New York management consultant organization. Small firms have more intimate management-employee relationships, an atmosphere that discourages thievery. Large companies, although often confronted with control of large plant areas, are usually aware of the problems and can more easily justify the expense of theft control.

For example, one large company estimates its security program costs $500,000/year. Don Darling, Van Nuys, Calif., security consultant, says that a professional administrator of a company security program can command between $12,500 and $18,000/-year. The alternative for companies that have a security problem but can't afford that expense is a consultant whose fees may range from $15-30/-hour, according to Darling.

Management Key: However, Jaspan Associates points to a less costly way out for the average firm: better plant management. In 50% of the cases where companies retain Jaspan to improve materials-handling methods, set standard practices, develop training procedures, etc., some form of employee theft is found. (The percentage is usually 85% when Jaspan is called in specifically to investigate theft.)

As a start, management must have a thorough knowledge of processes, procedures and the people who run them. Policies, procedures and job specifications should be in writing. A system of checks and balances, with more than one man in control of a given transaction, should be set up.

Yields must be calculated carefully; losses and gains should be checked closely. One vegetable oil processor discovered yields were actually higher than those calculated—but only after employees were caught selling the overage at below-market prices.

Inventories kept at low levels discourage a thief. And spot-checks can often avoid tempting situations.

Supervisory Problems: When yields or production rates are not automatically set by a process, management should be sure that the goals it establishes are reasonable. Hard-pressed supervisors who falsify records to meet goals are only one step away from theft.

And Jaspan finds that 60% of all plant thefts (on a dollar basis) are made by supervisory and executive personnel—the ones who establish the working atmosphere in the plant. (The chemical industry has a higher percentage of supervisors than have other industries.)

Some honest employees actually "don't regard it as stealing to take from the . . . impersonal bounty of the corporation . . . ," says Maj. Gen. Bryan L. Millburn (U.S.A., ret.), director of special programs at Temple University's Management Institute (Philadelphia), which began courses in industrial security last year.

The finding of one security specialist: pilferage of items worth less than $1,000 is not considered stealing by many employees.

The security director of one oil company feels that the disregard of

property value by employees is a backlash of World War II. Servicemen's sense of values were warped by the wartime waste of material, he believes.

But most security specialists agree that 99% of employees will not pilfer, especially if they think there is a chance of getting caught. It is up to management to create an "honest" atmosphere; and, sometimes, it doesn't take much. For example, cafeteria napkins at one plant were inscribed with the motto "Plant security is job security."

Several companies fingerprint new employees, admit that this is not primarily aimed at detecting thieves, but is useful mainly as a psychological deterrent to theft.

Employees at several Texas firms have been given lie-detector tests by Employment Advisors, Inc. (Austin, Tex.). Substantial reduction in thefts and improvement in employee morale are claimed to have resulted.

Darling persuaded one West Coast plastics maker to spend about $7.50/-person in a check of records of 25 employees, selected at random, as a means of cutting pilferage averaging about $3,000/month. The check included calls to three previous employers, an examination of criminal files and credit ratings. (Some security consultants feel that the cost of such a study is higher, closer to $15/person.)

Darling's results: 15 of the 25 had falsified their employment questionnaires or omitted derogatory information. Only one of the 25 was ultimately fired, but 12 plant employees (an abnormally high turnover for this plant) resigned during the investigation.

To Catch a Thief: One chemical company pays its guards a higher rate than that paid to hourly employees, adds many benefits and privileges given to supervisory and executive personnel. Results: a low theft rate.

Most companies prefer to hire guards who have little or no police experience. Reason: men with police experience, it is said, sometimes assume a manner that is offensive to employees.

Electronic detection devices, closed-circuit television, etc., are used by many companies to aid in theft detection. But all firms and security consultants admit that if employees really intend to steal, detection devices and guards are not sure-fire preventives.

The greatest deterrent, according to some companies, is immediate dismissal when a theft is uncovered, no matter how slight the offense may be. Others differentiate between crimes, prefer a more paternalistic approach.

For example, John Creighton, Standard Oil Co. of California's chief special agent, lists three types of offenses and punishments:

(1) "Borrowing": the worker takes tools for use at home, forgets to return them. If the worker is not a chronic borrower, he's a case for a supervisory lecture on the cost of borrowing. (Socal, like some other firms, tries to discourage borrowing of this type by setting up a system for loaning tools and equipment for home repairs.)

(2) Premeditated theft: the employee takes a tool, hides it, takes it home after the tool has been replaced with a new one by the company. When apprehended, the employee is fired.

(3) Sale of stolen items for profit: the thief is prosecuted, in addition to being fired. In one East Coast firm an employee, an instrument man, stole mercury from flowmeters, eventually caused an accident when repairs were begun on a unit that was believed to have been shut down.

But whether a company differentiates between degrees of theft or not, it cannot permit theft to go unpunished. The figures on cost show that stealing is too costly to ignore.

EQUIPMENT

Hardness Tester: Rex Gauge Co. (P.O. Box 46, Glenview, Ill.) is offering a new gauge for measuring the hardness of materials such as rubber and plastic. Readings are in units that comply with ASTM specifications for rubber hardness. The pocket-size gauge, designated Model 1500, uses a runner similar to that on tire pressure gauges. Rex says it may be dropped on the floor without damage. Weight: 1½ oz. Price: $59.50.

•

Temperature Radiometer: Williamson Development Co., Inc. (317 Main St., West Concord, Mass.) has an instrument for continuous temperature measurement (over 120 F) of distant surfaces. The unit can be used to measure surfaces that are in motion or might be damaged because they are coated with a paint, plastic or adhesive film that is curing or drying.

•

Draw-off Valve: The Johnston & Jennings Co. (4700 West Division St., Chicago 51) is offering a new non-freezing water draw-off valve with high capacity for draining the bottoms of storage tanks. The unit has two valves on the same stem; the inner valve may be closed while the outer valve is opened to permit the flushing of particles off the inner-valve seat.

•

Throwaway Clothing: Singer Glove Mfg. Co. (860 West Weed St., Chicago 22) has a new line of low-priced, flame- and tear-resistant clothing that may be thrown away after use.

•

O-Rings: Stillman Rubber Co. (5811 Marilyn Ave., Culver City, Calif.) says its new Viton O-Rings can be used at temperatures from —65 F to over 600 F. The rings resist deterioration caused by hot hydrocarbons, other hard-to-seal fluids such as solvents, fuels, lubricants, hydraulic fluids, acids and bases.

•

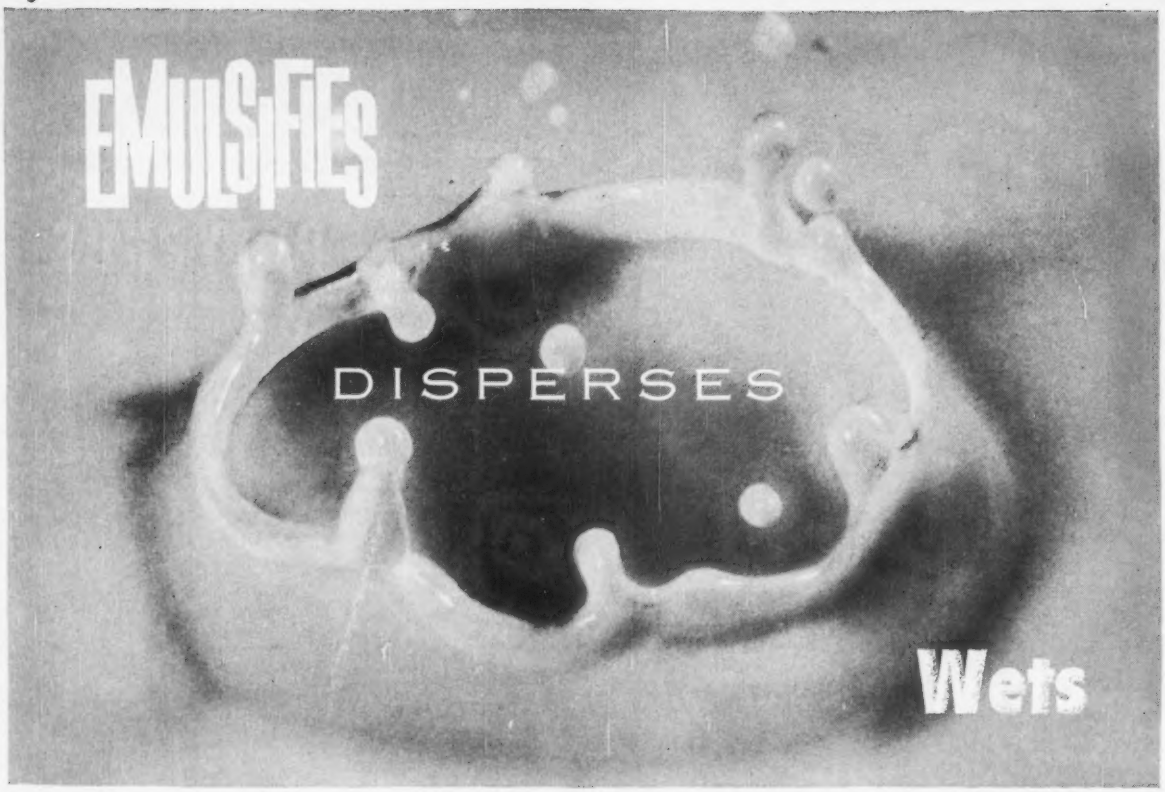
Flash Protection: New, light-sensitive goggles made by Wayne-George Corp. for protection from high-intensity flashes are the subject of a test report for the U.S. Air Force that is available from the Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C. (Report price: 75¢). The goggles work electromechanically, will flick closed in 500 microseconds, permit less than 0.01% light transmission.

•

Heated Gauges: The Jerguson Gage & Valve Co. (80 Adams St., Burlington, Mass.) is now offering a new line of electrically heated external-tube type gauges. Suggested applications: on equipment where steam is not available, where close control of gauge-glass temperature is necessary, and where gauges might freeze and break in cold weather.

•

Wire Strap: Velcro Corp. (681 Fifth Ave., New York 22) is now marketing a new nylon-tape fastener that has hooks on one side and loops on the reverse side. The tape can be used to strap several electric wires together in a bundle.



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features **low toxicity**, so much so that it is used to emulsify pharmaceutical materials. On the other hand, in urethane foam manufacture, this liquid emulsifier promotes the formation of uniform bubbles. As a post stabilizer for pigmented latex systems, it inhibits "prefloc."

EMULPHOR EL-620
also a liquid, is a good all-around emulsifier that has essentially the same properties and applications as its homolog, Emulphor EL-719. However, it differs in hydrophobic-hydrophilic balance and also in that it is **anhydrous.**

EMULPHOR ON-870
is **stable to strong acids and alkalis** and is therefore used in acid degreasing of wool. It is outstanding as an emulsifier of waxes. It is also valuable in emulsion polymerization and in post stabilization of latices.

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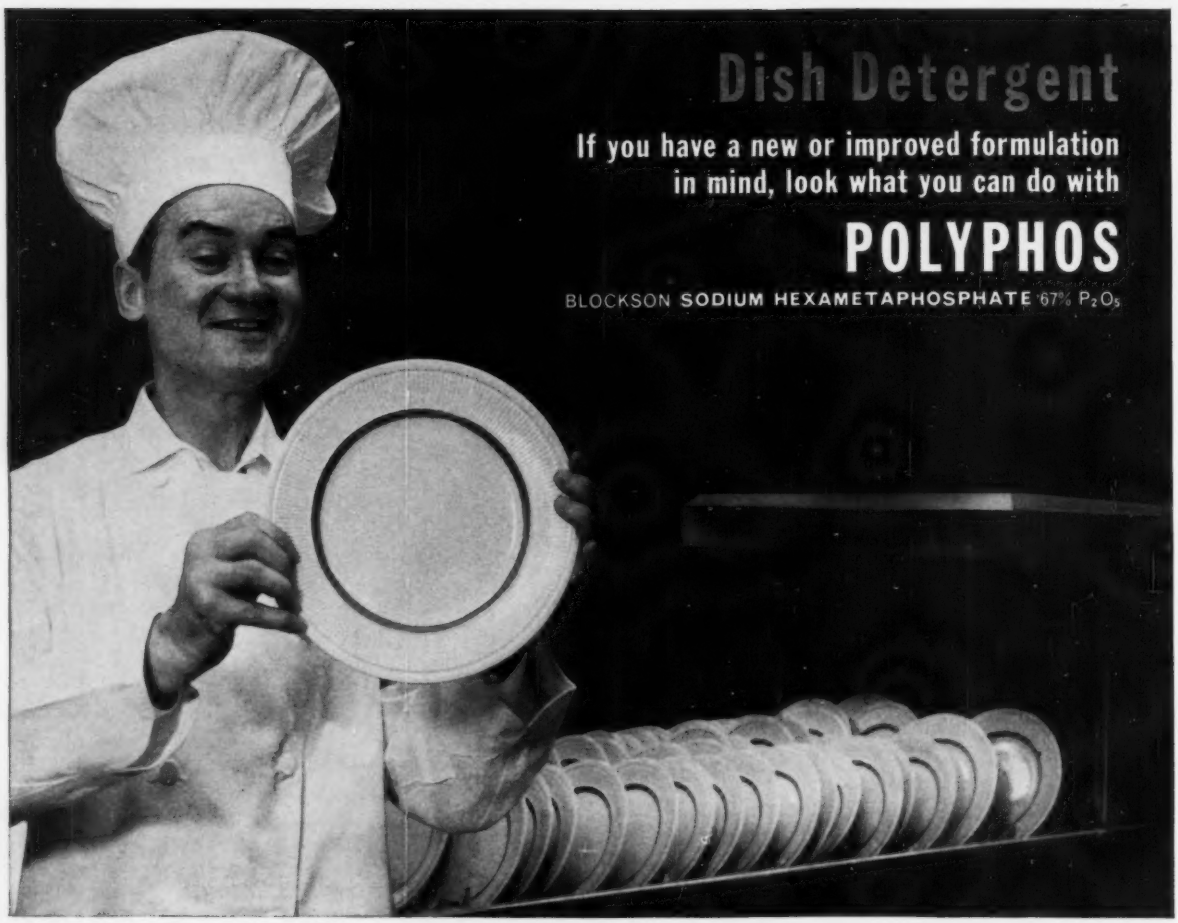


No matter what your new detergent idea may be, you can work it out better with Polyphos in your formula. If you seek the highest possible phosphate concentration, Polyphos gives it to you —67% P_2O_5 content PLUS a solubility of 150 parts in 100 parts water at 140° F.

If your objective is to increase the cleaning power of your detergent by using more alkali, Polyphos gives you more room to do it. That's because 25% less Polyphos will do the same water softening job as the best sodium phosphate runner-up. You can use that "extra room" to put extra alkali into your detergent.

Since Polyphos softens water by sequestration and not by precipitation, your detergent alkali is not used up by the softening process. With Polyphos in your formulation, you have automatically increased its cleaning power simply by increasing the alkaline availability.

Incidentally, Polyphos' very high sequestering power minimizes sparkle-inhibiting film on glassware.

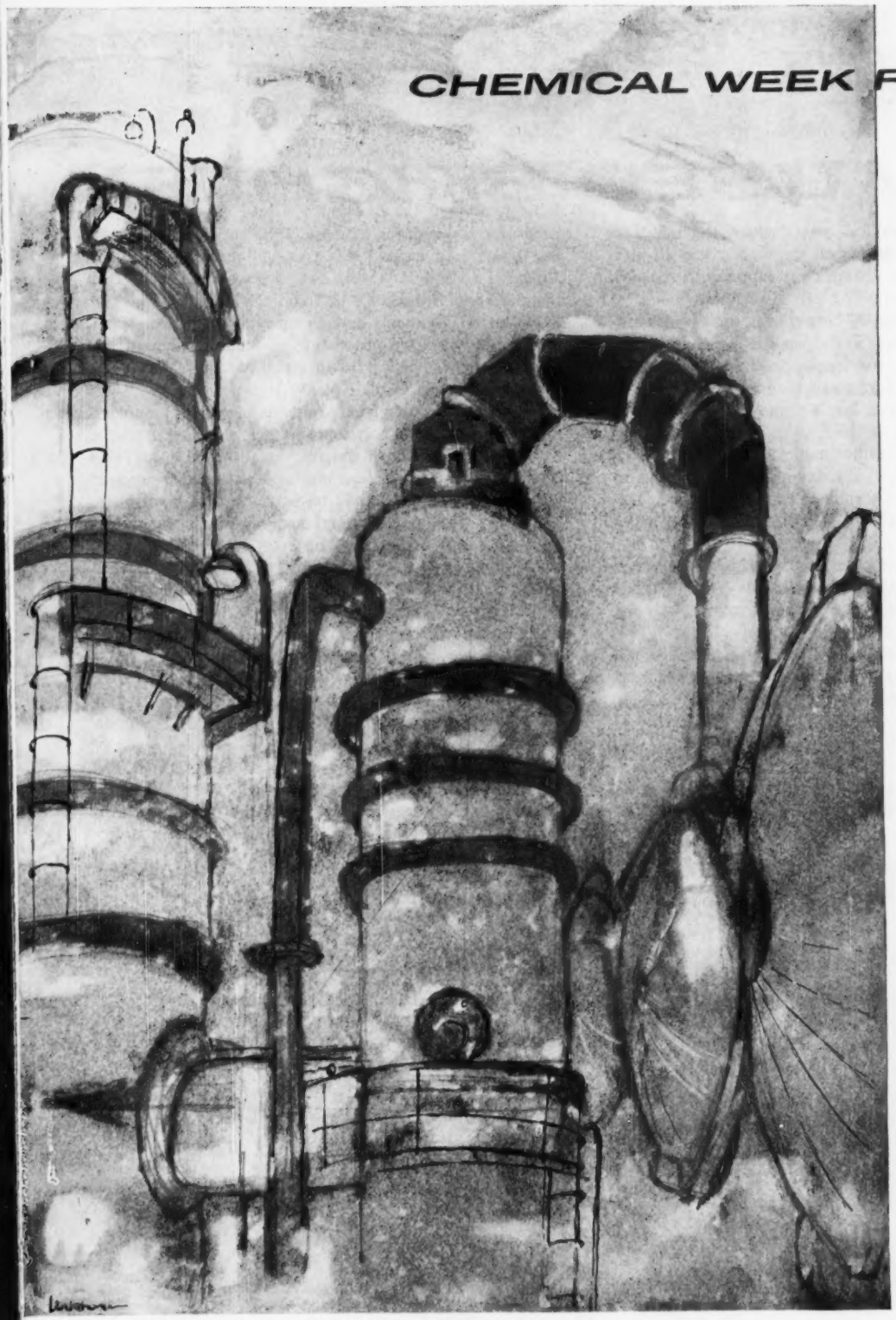
This, together with its optimum deflocculation and food-particle dispersion... assures more effective dish cleaning during the brief contact time available to the cleansing operation.

Another important advantage of working with Polyphos is its high compatibility, not only with the non-ionics, but with other components in your formulation. This high compatibility, plus the "assists" it provides the other components, lessens the need for critical formulation controls.

Polyphos assists even your wetting agent. Its presence enhances your dish detergent's free rinsing property. And not the least of its contributions is its optimum stability in the pH range where dish detergents function best.

This brief summation suggests why so many formulators consider Polyphos their most important single component. They know they can readily replace other formula ingredients. But nothing can take the place of Polyphos—Blockson brand Sodium Hexametaphosphate. May we send you a sample and data bulletin?

BLOCKSON **BLOCKSON CHEMICAL COMPANY,** *Chemicals Division Olin Mathieson Chemical Corp., Joliet, Ill.*



Houdry Process butane-dehydrogenation unit (left) at Firestone's Orange, Tex., butadiene plant highlights activity in C-4 fractions. This year 3.4 billion lbs. of butylenes will be used in chemical-manufacture. By '65 nearly 4 billion lbs. will be consumed for chemicals.

BUTYLENES

NEW USES BRIGHTEN

For butylenes in chemical manufacture, the mid-term outlook—through '65—shows no spectacular growth indications. Consumption in chemicals is expected to rise at a modest 5-7%/year rate.

Generally, consumption of butylenes in chemical manufacture has stepped upward in the past decade. In '50, some 1,280 million lbs. were used, and this about doubled (to 2,400 million) by '55. This year consumption is expected to be close to 3,420 million lbs., and move up gradually to nearly 4,000 million lbs. in '65.

Prime reason for this rather modest climb: bulk of the butylenes (normal and iso) is today—and will continue to be—consumed in synthetic rubber manufacture, an industry that has achieved, in the U.S. at least, a relative measure of maturity.

There are a number of other uses developing, however, that could inject a more rapid growth factor in butylenes' future, especially via the prime outlet, butadiene. Among these developments:

- Upcoming large-scale commercial production of *cis*-polybutadiene, an extender for natural rubber; and startup of pilot-plant production of a new high *trans*-polybutadiene rubber.
- Butadiene-based polymers in solid rocket fuels.
- Continuing growth in requirements for styrene-butadiene copolymer resins.

Butylenes consumption may also get a solid boost as needs for isobutylenes increase. U.S. butyl rubber capacity is slated to expand this year and next at the Baton Rouge, La., and Baytown, Tex., plants of affiliates Esso Standard and Humble Oil & Refining.

Escambia Chemical's semicommercial plant (Pensacola, Fla.) has just started production of methacrylic acid and methacrylate esters via isobutylene oxidation. And there are plans for a large-scale plant.

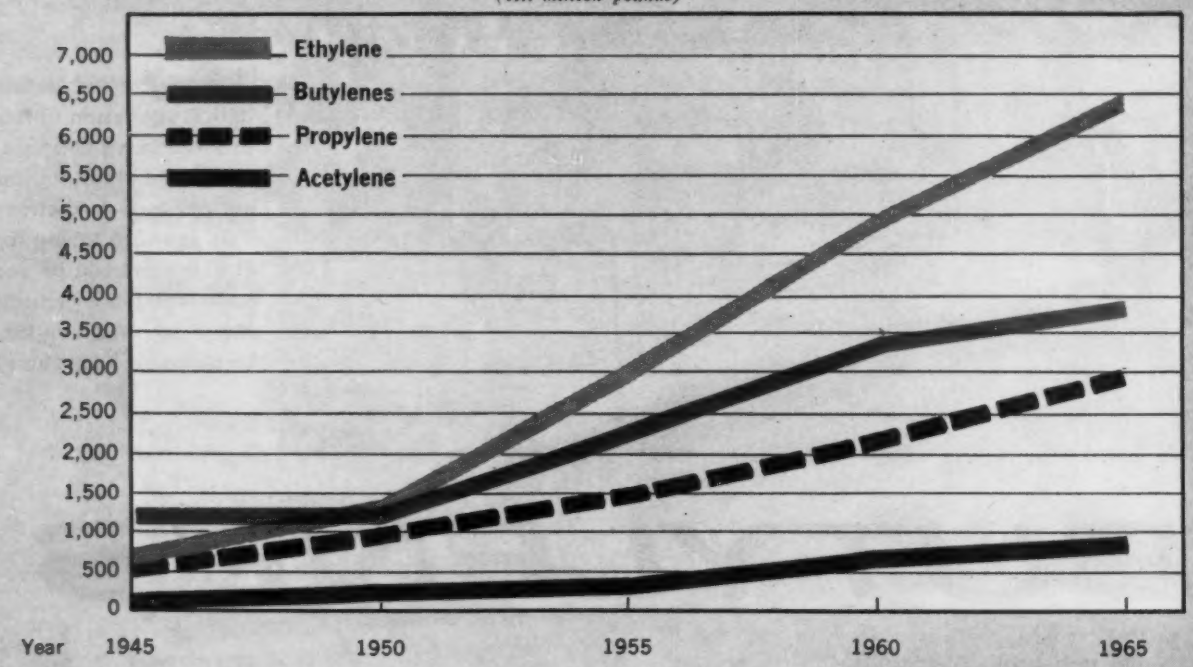
One possible commercial route to isoprene monomer, raw material for *cis*-polyisoprene (the so-called synthetic natural rubber), utilizes the reaction of isobutylene with formaldehyde. Polyisoprene may never completely replace natural rubber, but it could be an important supplement.

Another likely area for butylenes growth is in the plastics field. Last year Montecatini brought polybutylene plastic to the pilot-plant stage; it is being readied for commercial production in the U.S. by, among others, Petro-Tex, which will have a pilot plant operating later this year. Also reportedly seriously investigating the new polyolefin: Hercules, Spencer, Goodrich-Gulf and a number of other plastics makers.

Polybutylene is said to be a top-notch material for heavy-duty applications calling for exceptional resistance to stress and strain (e.g., plastic pipe, packaging films). Petro-Tex, which has extensively studied the field, indicates that polybutylene and polyethylene manufacturing costs are comparable; and in some instances—because more

Outlook for growth of butylenes in chemical manufacture*

(est. million pounds)



*Includes butylene equivalent of butadiene manufactured from butane.

BUTYLENES' FUTURE

filler material such as carbon black can be used without diluting desirable properties—polybutylene would be less expensive.

No. 2 Basic: In the late '40s, ethylene forged ahead of butylenes* as a major petrochemical building block. Since then the latter has maintained second spot, trailed by propylene and acetylene (*see graph, p. 62*).**

But to accurately plot the butylenes outlook in terms of production requirements and availability, demand for the major butylenes derivatives must first be surveyed.

As indicated in previous CHEMICAL WEEK petrochemical reports in this series, all forecasts assume there will be no marked change in the economic or international political climate, that there will be continuance of a reasonably high level of prosperity, with no serious depression or major war.

BUTADIENE

By '65, U.S. production of butadiene should reach 2.25 billion lbs.—nearly 25% higher than the '59 output of 1.83 billion lbs., and more than 56% above recession-depressed '58 production (*see table below*).

Output in '60 should come close to 2 billion lbs., still considerably under capacity, but an increase over '58.

* For the purposes of this report, butylenes include the equivalent of butadiene manufactured from butane.

** See also *CW special reports: Ethylene, April 25, and May 9, '59; Propylene, Nov. 14, '59; Acetylene, March 26.*

By and large, butadiene dominates the markets for all C_4 products. Of the three principal sources of butadiene in the U.S., the largest is catalytic or steam dilution of butylenes from refinery C_4 cuts (butanes and butylenes).

Dehydrogenation of field or refinery butanes is the second-largest source of butadiene. Five of the six plants using butane as a raw material employ Houdry Process Corp.'s one-step dehydrogenation process—essentially an adiabatic operation carried out over a fixed-bed catalyst without steam. The plants are those of Petro-Tex (Houston, Tex.), Texas Butadiene & Chemical (Channelview, Tex.), Odessa Butadiene (Odessa, Tex.), Firestone Tire (Orange, Tex.), and Standard Oil Co. of California (El Segundo, Calif.). Total capacity of the Houdry process users in the U. S. is nearly 700 million lbs./year.

(Houdry also has its butadiene process onstream at the Bunawerke Huels plant, Marl, West Germany, and at Japanese Synthetic Rubber Co. in Japan. A third foreign unit, at Ravenna, Italy, is slated for operation later this year.)

Phillips has used its own two-stage process at Borger, Tex., since the early '40s. The Phillips process differs from Houdry's in that the first stage, dehydrogenation of butane into butenes, is essentially an isothermal operation. The second stage, dehydrogenation of butenes into butadiene, employs steam dilution over a catalyst bed.

Plants of Esso, Union Carbide and Dow produce buta-

U.S. output* of butylenes derivatives

Derivative	1955	1956	1957	1958	1960	1965
	(est. million pounds)					
Butadiene	1,410	1,500	1,540	1,440	1,990	2,250
sec.-Butyl alcohol	225	260	250	260	265	280
Butyl rubber	125	165	150	120	210	320
Polybutenes	50	55	55	65	90	110
Oxoalcohols (octyl alcohol, nonyl alcohol, etc.)	45	55	50	60	65	80
Alkyl aromatics (butyl phenol, di-tert-butyl-*p*-cresol, di-tert-butyl-*p*-phenol, etc.)	25	31	33	30	35	50
tert-Butyl alcohol	25	30	28	28	30	35
Polyisobutylenes (other than butyl rubber)	20	23	25	23	25	30
Diisobutylenes** (octyl phenol, octyl cresol, etc.)	20	25	25	35	40	50

**Chemical Week* estimates based on government and trade data.
***Produced and consumed as diisobutylenes; does not include material reconverted into high-purity isobutylene for manufacture of alkyl aromatics and other products.

How much butylenes they require

Derivative	Conversion factor*	1955	1956	1957	1958	1960	1965
		(est. million pounds)					
Butadiene†	1.5	1,905	2,025	2,080	1,945	2,685	3,030
sec-Butyl alcohol	0.9	200	235	225	235	240	255
Polybutenes	1.02	51	56	56	66	92	115
Oxoalcohols	0.65 av.	30	36	33	39	42	52
Butyl rubber	0.99	124	163	149	119	208	317
Alkyl aromatics	0.6	15	19	20	18	21	30
tert-Butyl alcohol	0.9	23	27	25	25	27	32
Polyisobutylenes (other than butyl rubber)	1.02	20	23	26	23	26	31
Diisobutylenes	1.02	20	25	26	36	41	51
Other	—	12	16	20	24	38	67
Totals		**2,400**	**2,625**	**2,660**	**2,530**	**3,420**	**3,980**

*Pound of butylene per pound of product.
†Excluding butadiene derived as by-product of naphtha cracking, and allowing for butylene equivalent of butadiene made from butane.

diene as a by-product of ethylene manufacture; their total capacity today accounts for about 260 million lbs. of the total in-place U.S. capacity of 2,450 million lbs.

When Socony Mobil's 380-million-lbs./year ethylene plant comes in at Beaumont, Tex., early next year, it should be able to produce about 40 million lbs. of butadiene (*see table, p. 65*).

Only other foreseeable butadiene expansion in the U.S. (specifically planned, not by-product) is the $5-million, 50% increase at Copolymer Rubber & Chemical's Baton Rouge, La., plant. The expansion, engineered by Foster-Wheeler, will be completed about May '61, and will push the Copolymer plant's capacity to about 120 million lbs./year.

The company's broadening in butadiene underscores a purely logical reason for increasing capacity—"captive" use, e.g., synthetic rubber manufacture. Copolymer plans to boost its styrene-butadiene rubber (SBR) capacity to 125,000 tons, from the present 95,000 (*see table, p. 67*).

Too Much, Too Little: Perhaps the dominant feature of the U.S. butadiene market, evident for some time, is overcapacity. There will be enough butadiene facilities in operation by mid-'61 to more than cover foreseeable requirements to beyond '65. At present there is about 450 million lbs. of excess capacity in the U.S.

Butadiene got its start during World War II, when the government began pushing synthetic rubber on a big scale. Since butadiene was the product's principal ingredient, butadiene expansion appeared to be inevitable.

But under government ownership, butadiene production barely moved apace with synthetic rubber output—there was little incentive for additional expansion.

When the government sold its plants to private industry in '55, there were booming predictions regarding upcoming needs for synthetic rubber.

Butadiene capacity about doubled in less than three years, to about 2.3 billion lbs. in '58—when the automobile business slumped. At the low point, butadiene operations at Humble's Baytown, Tex., plant were suspended; Phillips' Borger, Tex., unit was shut down because of a strike—and there still was no shortage for synthetic rubber requirements.

In contrast, the butadiene market in early '56 was tighter than a drumhead. Goodrich-Gulf had just successfully bid on the government's then-idle 122,000-tons/year GR-S plant at Institute, W. Va., which had an indicated need for eventually some 200 million lbs./year of butadiene.

The Goodrich-Gulf and Texas-U.S. Chemical combination—with an eye on the anticipated bright future for petrochemicals and rubber—had considered hiking capacity of their giant, 400-million-lbs./year butadiene plant (Port Neches, Tex.) by an additional 200 million lbs./year.

So acute was the expected need for butadiene, that Publicker, which held a three-year lease on the government's butadiene-from-alcohol plant at Louisville, Ky., reactivated part of the operation in late '55, and actually contemplated upping production to the plant's near-180-million-lbs./year capacity.

Up—and Out: But within a year the boom had fallen. Publicker, for instance, stepped out of the alcohol-butadiene picture, explained that the company had only started such operations to fill the gap between over-all butadiene demand and the lagging supply of lower-cost petroleum-derived material. By late '56, it was evident that the synthetic rubber industry hadn't maintained earlier anticipated levels.

This almost complete dependency on rubber—some 90% of the butadiene consumed in the U.S. goes to styrene-butadiene and nitrile-butadiene (NBR) rubbers—has been a problem plaguing producers (*see table, p. 66*).

There is—and has been—much work under way to diversify butadiene's outlets, but synthetic rubbers will remain the prime outlet, perhaps for the next 20 years, say some market experts.

SYNTHETIC RUBBER

Latest available data on U.S. synthetic rubbers indicate that total production in '59 amounted to 1.38 million long tons. About 6,600 tons were imported, some 287,700 tons exported, for a net new-rubber supply just shy of 1.1 million tons.

U.S. consumption of synthetics moved upward from a low 887,000 tons in '58 to 1,073,000 tons last year (U.S. use in '59 broke all records), and may reach a total of 1,180,000 tons in '60. About 83% of this total will be SBR. Other major synthetics account for the following portions of the total synthetic rubber consumption: neoprene, about 8%; butyl, 6%; N-types, approximately 3.2%. In addition, there are the relatively minor specialties such as polyisoprene, polybutadiene, polyurethanes, chlorosulfonated polyethylenes, silicones, fluorinated rubbers, polysulfides, and others.

Natural rubber consumption also increased in '59 over '58—from about 484,000 tons to about 560,000 tons—but the synthetics stepped up their share of the total U.S. rubber market to about 66%. Here's how synthetic rubber consumption hop-skipped in a decade:

U.S. Synthetic Rubber Use

Year	(Long tons)
1950	538,000
1955	879,000
1959	1,072,000

At year-end, a Rubber Manufacturers Assn. report underscored the high level of '59 activity in every product segment of the rubber industry. Its new rubber consumption index for tire and tire products jumped from 115.6 in '58 to 189.3 in '59, compared with the '55 peak of 180.7 (1947-49 as a base).

RMA's President Ross Ormsby also reported an even sharper increase in the field of nontransportation outlets. Industrial rubber products, molded and extruded goods, belt and hose, packing, rubber footwear, flooring, rubber sundries, heels and soles, and other items, as a group, racked up a hefty 189.3 on the new-rubber consumption index in '59, compared with 159.7 in '58 and 180.7 in '55, the previous high year.

There is little doubt that records will be set this year.

One big reason: increased automobile production induced, in part, by enthusiastic acceptance of U.S.-made "compact" cars. Reports out of Detroit this month say new-car sales this year will be some 6.9 million—highest since the all-time high (7.9 million) set in '55.

Passenger tire shipments (original equipment and replacement) may climb to well over 100 million units, compared with last year's 95.5 million. Truck tire prospects are for shipment of nearly 16 million vs. '59's 14.9 million.

Nontire categories, which bounced along even in a recession year, are also expected to continue the upward trend.

All told, it augurs a healthy '60 consumption of synthetic rubber in the neighborhood of 1.18 million tons.

STYRENE BUTADIENE RUBBER

The so-called S-type synthetics are way out front in both production and consumption—and as a siphoner of butadiene. Currently, SBR takes just about 85% of all the butadiene consumed in the U.S.

Basically, the S-types (including regular, cold-S, cold oil black and regular black masterbatch) are the end-products of polymerization of butadiene and styrene in a 3:1 ratio.

SBR has come a long way in quality since it was made in war emergency plants. In the half decade under private industry ownership intense research and development have brought such significant developments as the "cold" rubber process, oil extension, improvements in color and in carbon black dispersion in black masterbatch. Improved carbon blacks, and other rubber chemicals today give SBR characteristics that make it competitive—and in many instances superior—in outlets once exclusively held by natural rubber.

Late last year* some definite trends in SBR's future were spelled out. Among them:

- Increased use of carbon black masterbatch because of cost savings to rubber products makers, and improved quality of masterbatch over dry-mixed carbon black.
- Increased use of oil black masterbatch for economy, and because oil extension will enable tire manufacturers to obtain softer, quieter-riding tires and still maintain (or improve) tread wear by use of finer, better dispersed carbon blacks.

SBR consumption, chiefly in tires, last year totaled some 886,000 long tons, a considerable increase over the 730,000 tons used in the previous year.

BUTYL RUBBER

Tires and tire products are also having a significant effect on butyl rubber, chief outlet for isobutylenes. Butyl, once considered a specialty rubber, took a long step toward achieving all-purpose status last year, when Esso splashed out with its all-butyl tire—tagged Bucron—on which it had been working for years. The material is a copolymer of isobutylene (about 98%) and isoprene (2%). The Bucron tire is produced by U.S. Rubber and Firestone (which has subsequently said it intends to market under its own

* At the Chemical Market Research Assn. meeting in Chicago Nov. 12-13, '59; a talk by Paul Cornell and Kendall Greene, of Goodrich-Gulf.

U.S. butadiene: producers, plants, raw-material

Producer	Plant Location	Est. Capacities* (million pounds/year) 1960	'61 Additions
From butylenes:			
Goodrich-Gulf and Texas-U.S.	Port Neches, Tex.	600	
Petro-Tex	Houston, Tex.	180	
Petroleum Chemicals	Lake Charles, La.	160	
Shell Chemical	Torrance, Calif.	140(1)	
Humble Oil	Baytown, Tex.	130	
Copolymer Rubber	Baton Rouge, La.	80	40
From butane:			
Phillips	Borger, Tex.	225(2)	
Petro-Tex	Houston, Tex.	220	
Texas Butadiene	Channelview, Tex.	200	
Firestone Tire	Orange, Tex.	120	
Odessa Butadiene	Odessa, Tex.	100	
Standard Oil (Calif.)	El Segundo, Calif.	32(1)	
From ethylene production:†			
Esso Standard	Baton Rouge, La.	110	
Union Carbide	Charleston, W. Va.; Seadrift, Tex.; Texas City, Tex.	89	12
Dow Chemical	Freeport, Tex.	64	8
Socony Mobil	Beaumont, Tex.	—	40
	Totals	2,450	100
	Grand total	2,550	

*Butadiene or butadiene equivalent.
(1) Shell and Standard Oil (Calif.) plants run in tandem; Standard provides Shell with butadiene-butylene stream from butane.
(2) Phillips uses mixed butane-butylene stream.
†Excluding crude butadiene such as produced by Allied Chemical, Wyandotte, Jefferson Chemical, etc., not directly consumed in chemical manufacture.

1960 U.S. butadiene consumption	
Outlet	*(est. million pounds)*
Styrene-butadiene rubbers (SBR)	1,700
Nitrile-butadiene rubber (NBR)	80
Adiponitrile	60
Styrene-butadiene copolymer resins (including paint and other latexes, terpolymers, etc.)	60
Exports	40
Other (rocket fuels, butadiene polymer resins, etc.)	50
	1,990

name), and is distributed by Atlas Supply (*CW, July 4, '59, p. 31*).

The potential market for the butyl tire is still a matter of conjecture, but there's a good chance that it may boost butyl tire consumption this year, at least 25% above '59's 145 million lbs. The main interest now is in the passenger car market, but butyl has been approved by the Army for use in military truck tires.

Although tire costs are difficult to compare, because of the many grades and makes on the market, the butyl product is said to cost about 20% more than the standard-type synthetic, but still less expensive than the so-called premium types.

Butyl tire advantages: shorter stopping distance; less noise of operation (no squeal on rounding corners), better resistance to ozone cracking.

Despite the advantages, though, there will likely be no wholesale switch to butyl by tire makers. Big hurdle facing Esso: trying to convince tire producers to buy butyl rubber even though they own their own synthetic rubber plants.

Total U.S. butyl rubber capacity is held by Humble Oil and Esso (*see table, p. 72*); at the beginning of this year capacity added up to 97,500 long tons.

A 20,000-tons/year expansion is nearing completion at the Baton Rouge, La., plant, and by mid-'61, an 18,000-tons addition will be completed at the Baytown, Tex., installation.

Only other butyl rubber capacity in the world is in Canada—Canadian Polymer Corp.'s 30,000-tons/year plant at Sarnia, Ont., and a recently completed 22,000-tons/year plant at Notre-Dame de Gravenchon, near Le Havre, France. The latter is operated by Societe du Caoutchouc Butyl (Socabu), formed in '55 by 10 French rubber, petroleum and chemical firms.*

Socabu employs basically the same process for butyl production as that used in the North American plants; all are licensed by Esso Research and Engineering.

Isobutylene comes from the adjacent Esso-France Port Jerome refinery and from the Gonfreville refinery of Compagnie Francaise de Raffinage. Isoprene is imported from the Baton Rouge, La., plant.

Butyl Outlook: There has been continuing research aimed at developing and broadening nontransportation outlets for butyl rubber, but the tire and tire products market still accounts for some 80% of total butyl consumption. This percentage is expected to change little over the next five years.

There is some increased usage of butyl rubber in wire and cable, and marketers expect this outlet will boost its butyl take to about 5,000 tons by '65.

Other industrial uses, which last year took nearly 11,500 tons, should slice out about 18,000 tons of the '65 butyl output. These current applications, including conveyor belts, steam hose, gaskets, seals, etc., are also pegged as potential outlets for Esso's newer halogenated (chlorine-containing) butyl, which is reportedly superior to regular butyl in rate of cure, heat resistance, and dynamic properties, while retaining superior air-holding and ozone-resistance characteristics.

Another potentially important butyl development centers on Goodrich's brominated product. Claim is that the brominated butyl, being test marketed at about 65¢/lb. (compared with 35¢ tag on chlorinated butyl), has better adhesion to the other rubbers, fabrics and metals, and better tensile strength of blends.

The big market for butyl rubber prior to '54 was in the manufacture of inner tubes, chiefly because of butyl's air-holding properties. Since the advent of the tubeless tire, butyl use has dropped but not as drastically as some thought it would. About 50 million butyl tire tubes are produced annually and, surprisingly, part of the demand comes from consumers who insert tubes in tubeless tires.

The U.S. exported about 22 million tons of butyl rubber in '59—about 60% more than in '58—but the circumstances so favorable to the U.S. makers aren't likely to happen again. The Canadian Polymer plant was strike-bound and out of operation for three months; the French Socabu installation had startup difficulties, leaving Esso as the world's only butyl supplier.

U.S. butyl exports will increase, but rather slowly from here on out. One estimate for '65: about 25,000 tons.

'SYNTHETIC NATURAL' RUBBER

Since synthetic rubber went commercial, few industry developments have caused as much stir as the so-called "synthetic naturals." This year and next, two, *cis*-polyiso-

* Compagnie Francaise de Raffinage, Esso-France, Michelin, Dunlop, Kleber Colombes, Kuhlmann, Rhone-Poulenc, Nobel Bozel, Pechiney and Ugine.

prene and *cis*-polybutadiene, will be well on the way to maturity, after years of piloting and semicommercial production. Here's what's shaping up:

- Polymer Corp. (Sarnia, Ont.) is wrapping up pilot-plant work on *cis*-1:4 polybutadiene, will move into real production "shortly." The company's pilot plant was designed for development work with stereospecific (Ziegler-type) catalyst systems.
- Shell Chemical's new, 40-million-lbs./year polyisoprene plant at Torrance, Calif., will be completed this fall. And a year later, Shell expects to be operating an 80-million-lbs./year integrated monomer-polymer plant "somewhere" in the Midwest. (The company is presently dickering for a plant site.)
- Phillips' spanking-new, 20,000-long-tons/year *cis*-polybutadiene facilities will begin operating in the fourth quarter of '60, start commercial shipments by Jan. 1, '61. And Phillips has developed a new, high *trans*-polybutadiene rubber, Trans-4, to compete in markets (now chiefly golf ball covers), with natural *trans* rubbers. Semicommercial production has been started.
- Firestone Tire's synthetic natural rubber plant will also be completed late this year. The unit will have a design capacity of about 30,000 long tons/year, start off with polybutadiene production. Later, if demand warrants, the plant will swing into polyisoprene production.
- Goodrich-Gulf is planning on a late-'61 startup date for a 25,000-tons/year polyisoprene and polybutadiene plant. The firm tells CHEMICAL WEEK it has not yet decided whether location will be at Orange, Tex., or Institute, W. Va.

Goodyear Tire, which has been running a $750,000 synthetic natural rubber pilot-plant operation since late '57, last week decided to go commercial. Construction of a plant (near Beaumont, Tex.) to turn out polyisoprene and polybutadiene will start immediately. Completion date is scheduled for mid-'61.

No plant-size figures are available, but the installation will cost approximately $25 million, have an eventual product capacity of about 30,000 tons/year.

CHEMICAL WEEK learns that Mobil's petrochemical complex now being built (*CW Ethylene Report, April 25*) will supply Goodyear with butadiene for polybutadiene and propylene for polyisoprene.

And the rubbers are being pushed to commercialization, or plans are being made, by a number of companies including Montecatini, Texas-U.S., U.S. Rubber, Petroleum Chemicals.

The *cis*-polybutadiene and other stereospecific polymers and copolymers, may well turn out to be major outlets for butadiene, but the proposed U.S. polyisoprene plants are based on isoprene monomer not derived from butylenes. Shell's process, for example, is said to use isoamylene cut from a C_5-rich refinery stream. Only other producers with a bit of isoprene available are Phillips and Humble.

A French process, that of the Institut Francais du Petrol, makes isoprene via the reaction of isobutylene and formaldehyde. Trade talk has it that the process may soon make a serious bid for commercial attention in the U.S. markets.

1960 styrene-butadiene rubber capacity

Producer	*Plant locations*	*Capacity* (est. thousand long tons/year)*
Goodrich-Gulf	Port Neches, Tex.; Institute, W. Va.	274
Goodyear Tire	Akron, O.; Houston, Tex.	256
Firestone Tire	Akron, O.; Lake Charles, La.	232
Texas-U. S.	Port Neches, Tex.	156
Shell Chemical	Los Angeles, Calif.	126
Phillips	Borger, Tex.	118
Copolymer Rubber	Baton Rouge, La.	95†
United Rubber	Baytown, Tex.	70
American Synthetic Rubber	Louisville, Ky.	69
General Tire	Odessa, Tex.	40
U. S. Rubber	Naugatuck, Conn.	32
Dewey and Almy	Cambridge, Mass.	10
International Latex	Dover, Del.	6
		1,484

*Includes oil and carbon black; estimates based on Attorney General's synthetic rubber report (1959) and trade data.
†Plans expansion to 125.

About a year ago Petroleum Chemicals signed a license agreement with IFP, and the company has been analyzing technical data, engineering design for the process, and cost estimates by the French organization.

Should PCI move into large-scale production of isoprene, isobutylene is readily available as a by-product of the purification of the butane-butylene stream that is the feedstock for the PCI butadiene plant at Lake Charles, La.

In the U.S., Houdry Process, about three years ago, privately spelled out the economics of isoprene production based on its dehydrogenation process. The process to make isoprene can use either isopentane from natural gasoline, or isoamylene as feedstock. If isopentane is used, the isoprene is produced in a one-step operation similar to that in the production of butadiene from normal butane.

Present Houdry butadiene process users could turn out isoprene by providing suitable purification facilities.

BUTADIENE CHEMICALS

Nonrubber outlets for butadiene account for less than 10% of the total consumed. But they can't be overlooked as potential butadiene growth areas. Take styrene-butadiene types of latex, for instance. In '60, these will make up well over half the estimated 70 million gal. of resin emulsion-based paints that will be splashed around by do-it-yourselfers and professional painters.

Other types of latex, polyvinyl acetate for one, will continue to barge into the paint outlet, but chances are styrene-

butadiene will hold on to a substantial share of the growing market.

Slated for a modest increase are the terpolymers, such as styrene-butadiene-acrylonitrile. One source pegs this outlet for butadiene at some 8 million lbs./year in the next several years.

All told, the styrene-butadiene copolymer resin group (*see table, p. 66*) will this year take about 60 million lbs. of butadiene.

Butadiene requirement for adiponitrile production, of course, will continue to depend on nylon 6/6 manufacture. Adipo is the common intermediate for hexamethylene diamine (HMD), which is reacted with adipic acid to make the nylon product.

Du Pont and Du Pont-licensee Chemstrand are the only producers of nylon 6/6, between them operate over 400 million lbs./year of capacity. Competition continues to get sharper between nylon 6/6 and the newer caprolactam-based nylon 6 (*CW, Sept. 26, '59, p. 22*), but the latter, in terms of U.S. productive potential, is still a fledgling.

Nylon 6 capacity of producers Allied, American Enka, Industrial Rayon, and Firestone, will add up to less than 50 million lbs./year by the end of '60. Proposed expansions by Allied will up total U.S. capacity to about 110 million within a year or so.

Du Pont, though, uses butadiene to make adiponitrile (for the nylon 6/6 component HMD) only at its Victoria, Tex., plant; the HMD is made at the Sabine River Works, near Orange, Tex. Furfural is the base for adiponitrile production at Niagara Falls, N.Y., and at Memphis, Tenn. Chemstrand uses an all-adipic acid route to nylon 6/6 at Pensacola, Fla.

Thus, butadiene's fortune in the nylon field will depend solely on the emphasis Du Pont places on the butadiene route. Chances are, however, that the butadiene for nylon 6/6 will not increase much beyond the currently estimated 60 million lbs./year through '65.

A rather broad miscellaneous group of butadiene-consuming products includes use as a component in rocket fuel and in butadiene polymer resins. Among the latter are Esso-developed Buton resins (known in their pilot stages as C-oils and Butoxys), now being commercially aimed at surface coating and plastic laminate markets. Initial capacity will be about 10 million lbs./year (Baton Rouge, and Baytown, N. J.), but this, says Esso, can be easily expanded to about 20 million.

There is no way of telling how much butadiene will be used in rockets, but a recent statement (*CW Technology Newsletter, Feb. 6*), by Rocketdyne's James Medford indicates that butadiene propellants may solve the problem of achieving 2-million-lb. thrust. A butadiene-acrylonitrile polymer is a major constituent of the first stage of the Minuteman ICBM missile.

All told, butadiene requirements this year may total about 2 billion lbs. The increase by '65, though, may be less than 15%, simply because of the modest growth forecast for the predominant rubber outlets.

Methyl ethyl ketone: 1961 end-use pattern

Outlet	*(est. million pounds/year)*
Solvent uses:	
Vinyl resin lacquers	80
Nitrocellulose lacquers	65
Other coatings (including acrylic)	15
Lube oil dewaxing	15
Paint removers, misc. solvent uses	20
Rubber cement, adhesives	15
Exports	12
Other (including nonsolvent uses)	13
Total	235

U.S. methyl ethyl ketone capacity

Producer	*Plant location*	*Capacity (est. million pounds/year)*
From sec-butyl alcohol:		
Shell Chemical	Dominguez, Calif.; Houston, Tex.; Norco, La.	175
Esso Standard	Bayway, N.J.	100*
From butane oxidation:		
Celanese	Pampa, Tex.	10
Union Carbide	Brownsville, Tex.	40 (early '61)
	Capacity in place, end of 1960	260

*Esso reportedly allocates about 25% of MEK capacity to acetone production (*CW Propylene Report, Nov. 14, '59*).

SBA-MEK

In the U.S., secondary butyl alcohol (SBA) is produced for the most part for captive consumption in the synthesis of methyl ethyl ketone (MEK). At present about 90% of the SBA is so consumed; the remainder goes into solvent markets as such.

Conversely, bulk of the MEK produced in the U.S. is made from SBA in integrated plants of Shell and Esso (*see table, left*). Celanese' capacity is about 10 million lbs./year at Pampa, Tex., as by-product of LPG oxidation.

Biggest MEK news, of course, was Union Carbide's disclosure a couple of months ago that it would become the third "on-purpose" producer of MEK at the ill-fated Hydrocol plant (Brownsville, Tex.) that it bought from Amoco in late '58. (Among other chemicals to be made at the plant, now being renovated, are acetic acid and acetic anhydride.) The route to MEK will be butane oxidation, and production should start early next year in the estimated 40-million-lbs./year unit.

Carbide's entry may aggravate somewhat a rather over-

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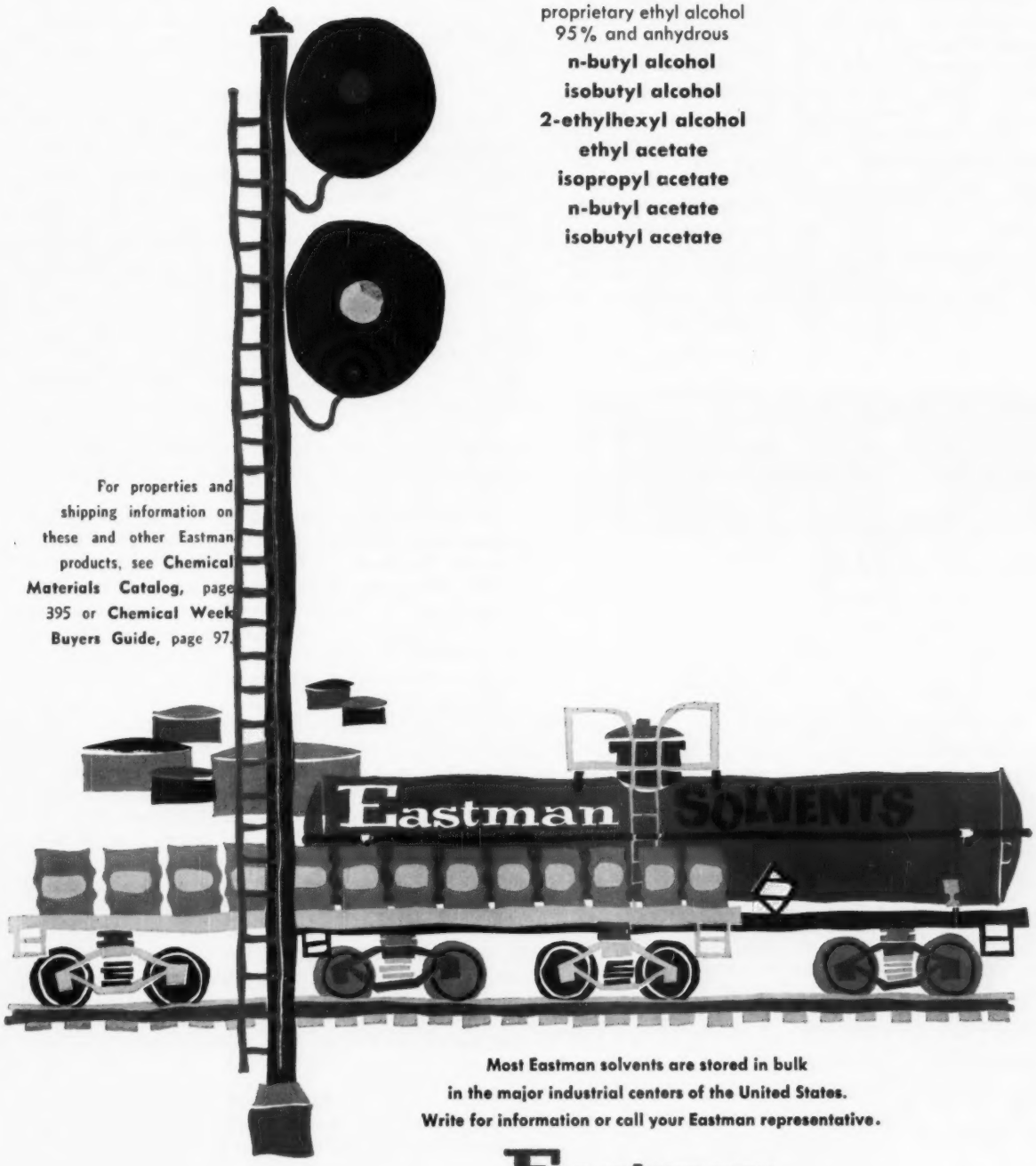

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supplied market. But it could be worse: if all producers were to run full-tilt next year, total capacity would actually be about 325 million lbs., compared with an anticipated '61 demand for some 235 million. It'll be some time, though, before major producer Shell's Norco, La., plant will be operating at top level. And Esso has reportedly switched about 25% of its 100-million-lbs. capacity at Bayway, N.J., to acetone production.

More than 70% of the MEK consumed is used by the surface coating industry for various lacquers. Vinyl resin lacquer use next year is slated to run ahead of the nitrocellulose products in a trend that has been evident over the last few years. Reason: major car makers swing away from nitrocellulose lacquers to alkyd types for auto finishes.

Heading the list of minor uses for MEK is dewaxing of lubricating oil, which next year should consume some 15 million lbs. Other outlets include paint removers, cements, adhesives, and about 5% that go into exports.

Some moderate gains are anticipated over the next five years in MEK consumption, which should call for approximately 255 million lbs. of n-butenes for SBA manufacture.

Major U.S. polybutenes producers, plants, capacities

Producer	*Capacity (est. million pounds/year)*
Standard Oil (Indiana) Wood River, Ill.; El Dorado, Ark.; Yorktown, Va.	50
Standard Oil (Calif.) Richmond, Calif.	25
Cosden Petroleum Big Spring, Tex.	20
Texas Butadiene* Channelview, Tex.	†
Est. 1960 U.S. capacity	95

*Recently licensed by Cosden. †8-million lbs./year plant considered.

1960 U.S. polybutenes* consumption

Outlet	*(est. million pounds/year)*
Lube oil additives	38
Calking and sealing compounds	38
Adhesives	3
Rubber compounding	2
Electrical oils	1
Exports	5
Other (potting compounds, inks, roofing compounds, etc.)	3
	90

*Viscous liquids up to the semisolid stage, excluding polyisobutylenes of the Vistanex type that go into lube oil additives at an estimated 20-million-lbs./year rate.

POLYBUTENES

Low-molecular-weight polybutene (polyisobutylene) is garnering particular interest in the trade this month, with word that an American process is being exported. Cosden Petroleum—a relative newcomer to petrochemicals production—has just granted a license for use of its technique to Naphtachemie, a Paris-based organization. Under terms of the agreement, Cosden will provide process and technical know-how for a plant to be constructed near Lavera in the south of France.

Cosden also made news along this line in mid-'59, when it completed doubling of its own polybutenes capacity at Big Spring, Tex. (to 20 million lbs./year), and revealed that it had licensed its process to Texas Butadiene.

The latter has not yet decided to get into production, but if it does, size of the polybutenes unit (to be built at its Channelview, Tex., complex) will likely be some 8 million lbs./year (*see table, left*).

The low-molecular-weight polybutenes, as well as the higher-molecular-weight polisobutylenes of the Vistanex type, lean heavily on the lube oil additives market.

The isobutylene derivative and polymers of alkyl methacrylates are the two most commonly used viscosity index (VI) improvers—compounds that improve the viscosity-temperature relationship of oils beyond that obtained economically by refining methods.

Lubricating oil sales in the U.S. last year, for example, amounted to 2.02 billion gal., with automotive lubricants accounting for nearly 1.01 billion gal. Lube oil markets took a total of 110-120 million lbs. of VI improvers.

The low-molecular-weight product use is also climbing steadily in many specialty outlets. This year, some 38 million lbs. will go for calking and sealing compounds—about the same quantity to be used in lube oil additives. Smaller amounts will be used for potting compounds, inks, leather impregnation, tires, footwear, roofing, etc.

Approximately 118 million lbs. of butylenes will be consumed in the production of polybutenes and nonrubber polyisobutylenes this year, a sizable step-up from the estimated 82 million so used as recently as '57. Outlook for '65 is for a butylenes demand in this area of close to 150 million lbs.

BUTYLENES

From a markets point of view, it appears that the chemical butylenes pie divides up into one big chunk, a few small slices, and several thin slivers. Butadiene alone this year will take about 78%; some 18% will be shared by sec-butyl alcohol, butyl rubber, and polybutenes; and the remainder—about 4%, by, among others, certain oxoalcohols, alkyl aromatics, tert-butyl alcohol and diisobutylene (*see table, p. 63*).

These minor categories were consuming about 85 million lbs. in '55, have increased their butylenes require-

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Butyl rubber: U.S. producers, plants, capacities

Producer	Capacity (long tons) 1959	Planned additions
Esso Standard* Baton Rouge, La.	40,000	20,000 (mid-'60)
Humble Oil Baytown, Tex.	57,500	18,000 (mid-'61)
Totals	97,500	38,000

*Esso Standard and Humble were recently merged into Humble Oil & Refining, but for purposes of identification they are listed separately in this report.

U.S. butyl rubber: where it comes from

	(long tons) 1959	1965
Produced domestically	81,000	143,000
Stocks	5,300	—
Imports	2,000	4,000
Total supply	88,300	147,000

U.S. butyl rubber: where it goes

Outlet	(long tons) 1959	1965
Transportation (tires, tubes)	51,500	95,000
Wire and cable	3,600	5,000
Other industrial (conveyor belts, steam hose, gaskets, seals, etc.)	11,400	18,000
Exports	21,800	25,000
Totals	88,300	143,000

ments to over 130 million lbs./year at present. In the next five years raw-material demand is expected to increase about 25%, to 165 million lbs. In addition, miscellaneous uses may add about 67 million to the total.

One such use—production of maleic anhydride via butylenes instead of benzene—may be nearing fruition. A recent newspaper item reported that Petro-Tex was contemplating construction of a 30-million-lbs./year maleic plant in Texas or on the East Coast. Butylene made from normal butane extracted from natural gas reportedly would be the starting material.

When queried by CHEMICAL WEEK, company officials would neither deny nor confirm the published statement. It is known, however, that Petro-Tex has been making pilot-plant quantities of dibasic acids starting with C_4 feedstocks; the firm has filed patents on unique features of their process.

As for propylene, the bulk of butylenes available—some marketers estimate as much as 88%—is consumed at refineries for alkylation (high-octane gasoline), polymerization (aviation gas), or burned as fuel.

Approximately 80% of the butylenes available for chemicals and rubber manufacture today comes from refinery gas either as butylene or derived from butane; most of the remainder comes from natural gas butane.

At the height of the recent petroleum industry race toward still higher-octane gasoline, there was some concern in the trade that alkylation processing demand would shrink the supply of butylenes for chemical manufacture. Such fears are currently being allayed by two developments: the advent of the "compact" cars with lower compression ratios, and the rapid growth in jet aircraft manufacture, which has cut the total need for avgas.

At any rate it's now likely that refinery operations will furnish some 3.2 billion lbs. and natural gas about 776 million lbs. of chemical butylenes annually by '65. That compares with the '58 breakdown of 2 billion and 515 million lbs., respectively.

Petro Perspective: By '65, petrochemicals—including those derived from the four basics, ethylene, propylene, acetylene and butylene—will account for some 33% of an estimated 260 billion lbs. of industrial chemical production, and close to 70% of the near-$17-billion value of industrial chemicals to be turned out in the U.S.

Towering over other major segments then, will be the ethylene industry, which today contributes about $2 billion of product to the economy.

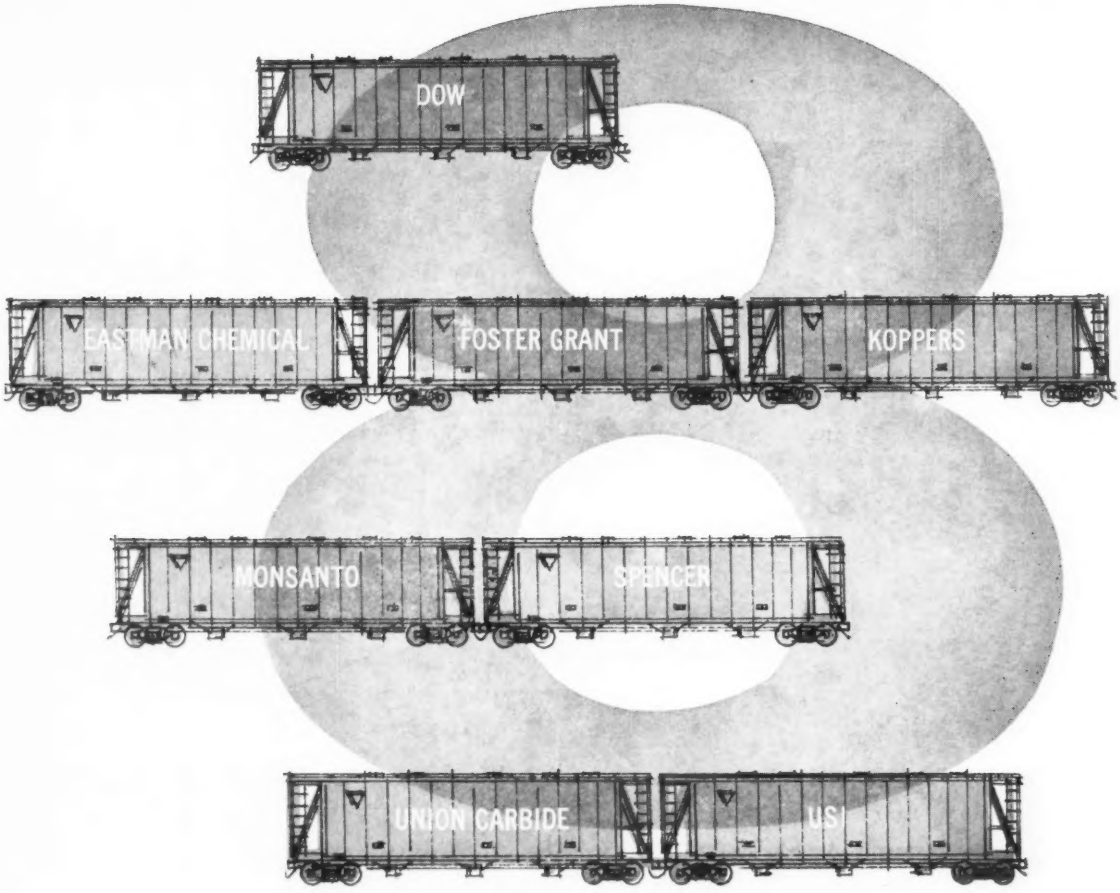
In the line-up of basics, however, butylenes will continue to hold second position, despite the rather moderate outlook plotted in this report. Value of butylene products today runs about $1 billion, half that of ethylene derivatives. But by comparison an acetylene product value would be less than $800 million, and propylene, approximately $600 million.

This special report is the fourth in CHEMICAL WEEK'S *depth studies of the major petrochemical raw materials: ethylene, propylene, acetylene and butylenes. With their chemical derivatives, they represent nearly $4.5 billion of product.*

The five-year outlook for all four basics is one of heartening growth. Ethylene, of course, will maintain its lead as top raw material, with a '65 chemical consumption prospect of approximately 6.5 billion lbs. Butylenes use is slated for a moderate climb to about 4 billion lbs.

Propylene, now being consumed in chemical manufacture at a rate of about 2.26 billion lbs./year, is well on its way to a '65 level of nearly 3.1 billion lbs., thanks chiefly to mushrooming polypropylene demand.

The acetylene outlook is somewhat clouded, because of increasing competition from ethylene, propylene and other olefins, but it, too, is expected to increase over the next half decade.



8 major chemical companies are now using the **DRY-FLO® CAR** for bulk shipment of **POLYETHYLENE** and **POLYSTYRENE**

Ask the nearest General American office about the advantages of bulk shipment for your product.

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Airslide® and Dry-Flo® Car Division
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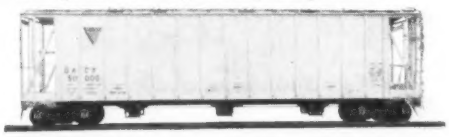
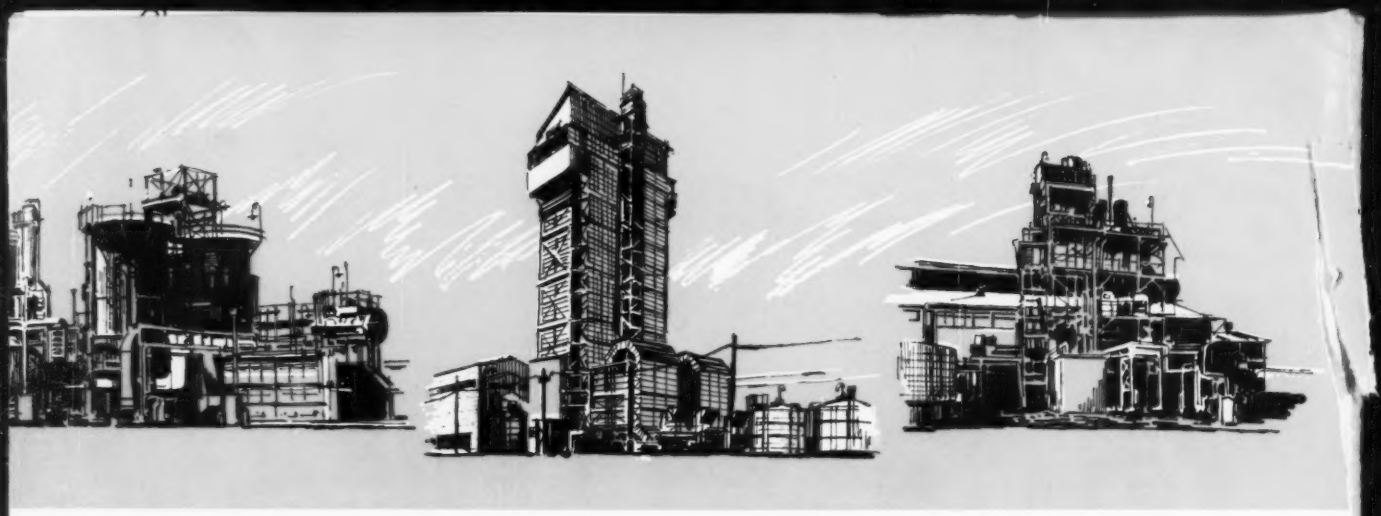


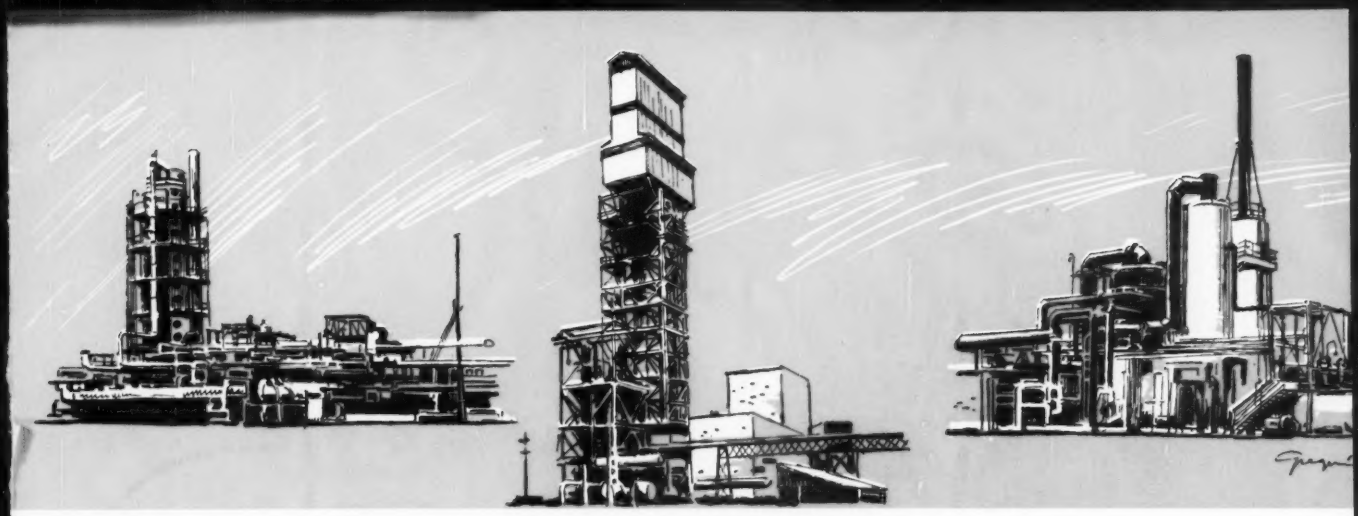
The Dry-Flo® car provides maximum sanitation and full protection for materials that require careful handling.



Chemicals for the soil...

Chemico has production-proven processes for the major fertilizer chemicals

ammonia / ammonium sulfate / ammonium nitrate
ammonium phosphate / superphosphate
triple superphosphate / urea / complex fertilizers
nitric acid / sulfuric acid / phosphoric acid



In India, Pakistan and Japan; in England, France and Italy; in Hawaii, Sumatra and Formosa; in Australia, South Africa and South America; in more than half the states of the Union and in every highly populated area on earth, Chemico-designed plants are producing basic fertilizer chemicals to increase world food production.

Chemico's experience in designing plants to produce fertilizer chemicals is unmatched by any other engineering company in the world. More than 200 Chemico sulfuric acid plants are now in operation. Sixty-five Chemico ammonia plants are on stream or under construction. In January of this year, Chemico completed its thirty-fourth nitric acid plant. Other Chemico plants now in production or under construction have capacities for producing 3,700,000 tons per year of ammonium sulfate and 1,600,000 tons per year of ammonium nitrate. When the capacity of the Chemico urea plants now under construction in Pakistan and the U. S. is added to what is being produced at plants in Japan, Canada and elsewhere in the U. S., the Chemico urea process will account for more than 400,000 tons per year.

Chemico's proven processes are transformed into efficient operating plants with maximum speed and with minimum expense to the client. Ease of start-up and low operating costs are just two of the more obvious advantages of Chemico plants. If your company is considering the construction of additional production facilities, or the expansion of your present plant, Chemico will help you find the most efficient and economical solutions to your process problems.

CHEMICO

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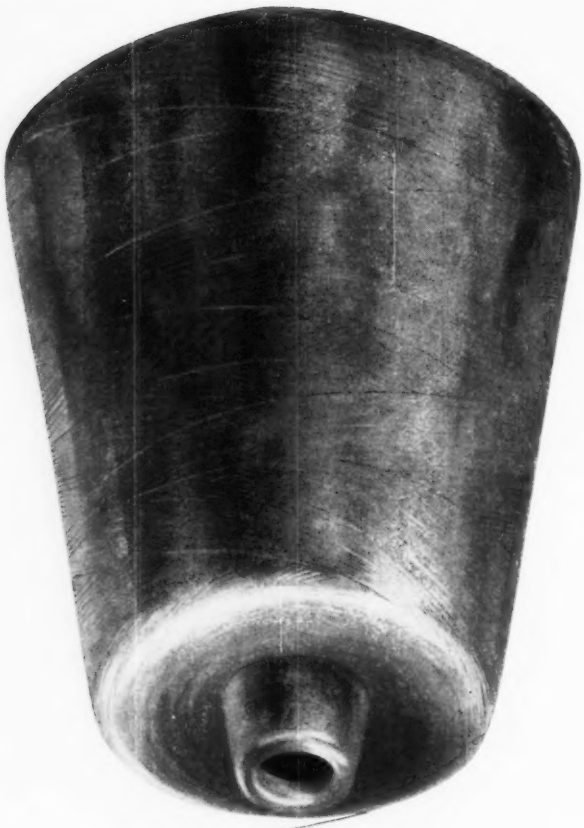

At every stage of textile processing, Nopco products perform an essential function. Nopco textile lubricants and antistatic agents are geared to modern high-speed textile machinery. Scouring and finishing chemicals are available for the processing of all fibers. And Nopco provides essential chemicals for other industries, too . . . leather, paper, food, plastics, to mention only a few. For a skilled hand in practical chemistry, look to Nopco.

For complete information see Chemical Materials Catalog, pages 212-213.

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Technology
Newsletter

CHEMICAL WEEK
May 28, 1960

A new steelmaking process that more than doubles open-hearth output was disclosed last week by Ford Motor Co. Keys: the addition of natural gas to the oxygen introduced through lances; substitution of burned lime for the limestone used in conventional open-hearth operations. This combination speeds the chemical and thermal reactions during the initial scrap-melting stage of the open-hearth cycle, permits molten iron to be added to the charge more rapidly without danger of "freezing" in the furnace.

In experimental runs, to date, Ford has more than tripled the production rate of a 20-ton furnace—from its original 20-tons/hour to an average of 67.6 tons/hour. Steelmakers are generally skeptical of the feasibility of more than doubling open-hearth production with existing handling facilities (furnace-charging and steel-pouring equipment); they also question the economics of substituting burned lime, costing $20/ton, for limestone, which costs only $2.50-$3/ton.

Ford plans to boost oxygen capacity of its River Rouge mill from 50 tons/day to about 300 tons/day in about 18 months, as part of a $35-million modernization program launched last year. Although the company believes the new process will greatly enhance the competitive position of open-hearth furnaces, it plans to continue to buy the greater portion of its steel requirements from outside suppliers.

•

Lower-cost saline water conversion is the goal of heat transfer studies now under way at Southwest Research Institute (San Antonio, Tex.). The work is sponsored by the Office of Saline Water, U.S. Dept. of Interior.

Working with acoustic vibrations, SWRI finds that 10-450% improvement in heat transfer coefficients is possible. A vibrator, fastened by a short rod to a 1-in. pipe inside a 3-in. pipe, creates turbulence in the water film on the outer surface of the 1-in. pipe. This improves the heat transfer. Among the points still to be studied: effect of acoustic vibrations on steam condensation and scale formation on the tube surface.

•

Plans for three commercial irradiation plants for presterilization of packaged medical and pharmaceutical products were disclosed last week by Britain's Atomic Energy Authority. A prototype plant at AEA's $2-million Wantage isotope research center will be started next month. Up to 80% of the prototype's capacity has been allocated to eight pharmaceutical and surgical firms for irradiating production batches.

•

A new encapsulating machine that makes 90,000 capsules (each 100 microns in diameter) per second has been designed by Southwest Research Institute (San Antonio, Tex.). More than 100 companies have reportedly shown interest in the past eight months the machine has been under development. SWRI has evaluated a number of synthetic and natural polymers as shell materials, including gelatin, calcium alginate,

polyvinyl chloride, poyvinyl alcohol, saran, and acrylic resin. Fill materials tried: liquid and chlorinated hydrocarbons, esters, mineral and vegetable oils, industrial catalysts, and high-energy fuels.

Possible uses for the new device are in combining otherwise chemically incompatible materials into the same formulation; a convenient and relatively safe means of storing and handling hazardous, reactive, toxic or noxious materials; and as a means of controlling release of contained chemicals.

•

Savings from use of platinized-titanium anodes in making chlorine (*CW, Dec. 12, '59, p. 67*) have been pinpointed by Crucible Steel Co. of America (Pittsburgh). Assuming that its laboratory results can be reproduced in production-size diaphragm cells, Crucible figures anode costs (based on the dissolution rate of platinum) may be $2/ton of chlorine or lower, compared with $3/ton of chlorine for graphite anodes.

Lower overvoltage of platinum may save 0.15 volts—a power savings of about 100 kwh./ton of chlorine. Crucible also points out there would be no additional power losses, as encountered in present cells when the graphite anodes wear down and increase the anode-to-cathode distance. (In mercury cells, adjustment mechanisms that compensate for graphite anode wear could be eliminated by using platinized-titanium anodes.)

•

Surface pretreatment of paperboard with borax solution is Du Pont's proposed route to broader use of polyvinyl alcohol as surface sizing. PVA has been limited in paper and paperboard sizing uses because it penetrates too deeply. According to Du Pont researchers, the borax holds down penetration, results in superior coating properties, compared with other pretreatments, such as starch, sodium carboxymethylcellulose and sodium alginate.

•

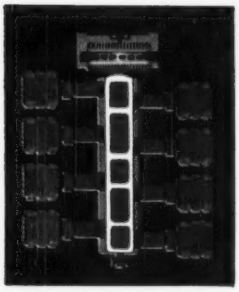
Electrostatic dry coating process for making flat-gummed paper is now in use by the Brown-Bridge Mills, Inc. (Troy, O.). In the process water-soluble adhesives and flexible binder material are applied as a dry powder; solvents are eliminated. Laboratory and plant equipment were developed by Battelle Memorial Institute (Columbus, O.) and the Dilts Division of the Black-Clawson Co. (Hamilton, O.).

•

Home-baked flavor for instant-mix bread is instilled by a new chemical approach researched jointly by Arthur D. Little, Inc. (Cambridge, Mass.) and the U.S. Army Quartermaster Food & Container Institute in Chicago. Cottonseed in the mix is hydrolyzed with an enzyme to yield arginine and histidine—the secret of the aroma. Gluconodeltalactone and sodium bicarbonate are used instead of yeast.

With the new mix, a loaf of bread can be baked in 45 minutes instead of 5-6 hours normally required to make bread. It's inexpensive, may find general consumer markets.

WILL YOUR NEXT BALANCED OPPOSED COMPRESSOR HAVE ALL OF THESE "HIDDEN VALUES"?



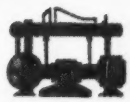
No, it won't! Even if you choose a Worthington compressor, you'll get only 23 of the 24 "hidden values" pictured below. (Just to pique your interest one is fictitious. For identification of the phony feature, see page 84.)

Compressors should be evaluated on performance, we think you'll agree. But performance is determined by factors which aren't easily checked against service conditions and data. These are the factors we call "hidden values." It will pay you to evaluate these values the next time you specify a compressor. Worthington Corp., Clinton Street and Roberts Ave., Buffalo 5, N. Y. 36-8

WORTHINGTON

OPTIC COMPARATOR is used to check connecting rod bolt threads for uniform angles, lead and form.

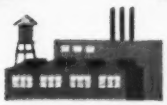
WIRE ALIGNMENT during assembly using electronic equipment minimizes field alignment problems.



FACTORY ASSEMBLY of intercooler and interstage piping reduces installation problems and costs.

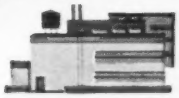
COMPOSITION TEST determines constituents of molten iron in each ladle before any casting is poured.

HONING of connecting rod crankpin and crosshead pin ends results in tighter fits, no loose shells.



INTEGRATED DIV. includes foundry, manufacturing, sales, service and engineering in one location.

ULTRASONIC TEST— an advanced method of examining certain critical parts for internal quality.



$1,000,000 ADDITION TO LABORATORY assures sound equipment designs based on actual research.

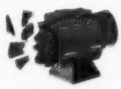
ANALOG/COMPUTER simulates wide range of actual operating conditions for optimum design analysis.

PROFILOMETER inspection of highly finished parts assures easy break-in and long life.

KOLENE PROCESS removes impurities from bearing shell that weaken bond between it and babbitt.

CAST-IN LUBE OIL SYSTEM with internally drilled oil passages eliminates crankcase "plumbing."

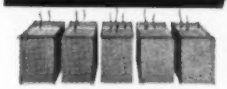
MAGNAFLUX AND MAGNAGLO inspections are widely used to expose surface imperfections.



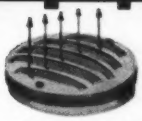
DESTRUCTION TEST of complete compressor cylinders verifies engineers' design calculations.

REMOVABLE DOWEL locks piston rod to crosshead — prevents turning due to loosened crosshead nut.

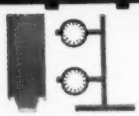
FINISHED GROUND BEARING SHELLS provide positive full-contact backing for long life.



PARCO-LUBRITING of critical wearing surfaces completely eliminates most start-up scuffing problems.



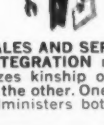
FEATHER VALVE— industry's preferred compressor valve—is efficient, quiet, and low in maintenance.



CROSSHEAD SLIPPER ADJUSTMENT within one-thousandth of an inch assures much longer packing life.

THERMODYNAMICS SECTION analyzes each application to size unit and determine its performance.

STEEL TIE BAR, keyed and bolted in place, strengthens frame and maintains the original alignment.

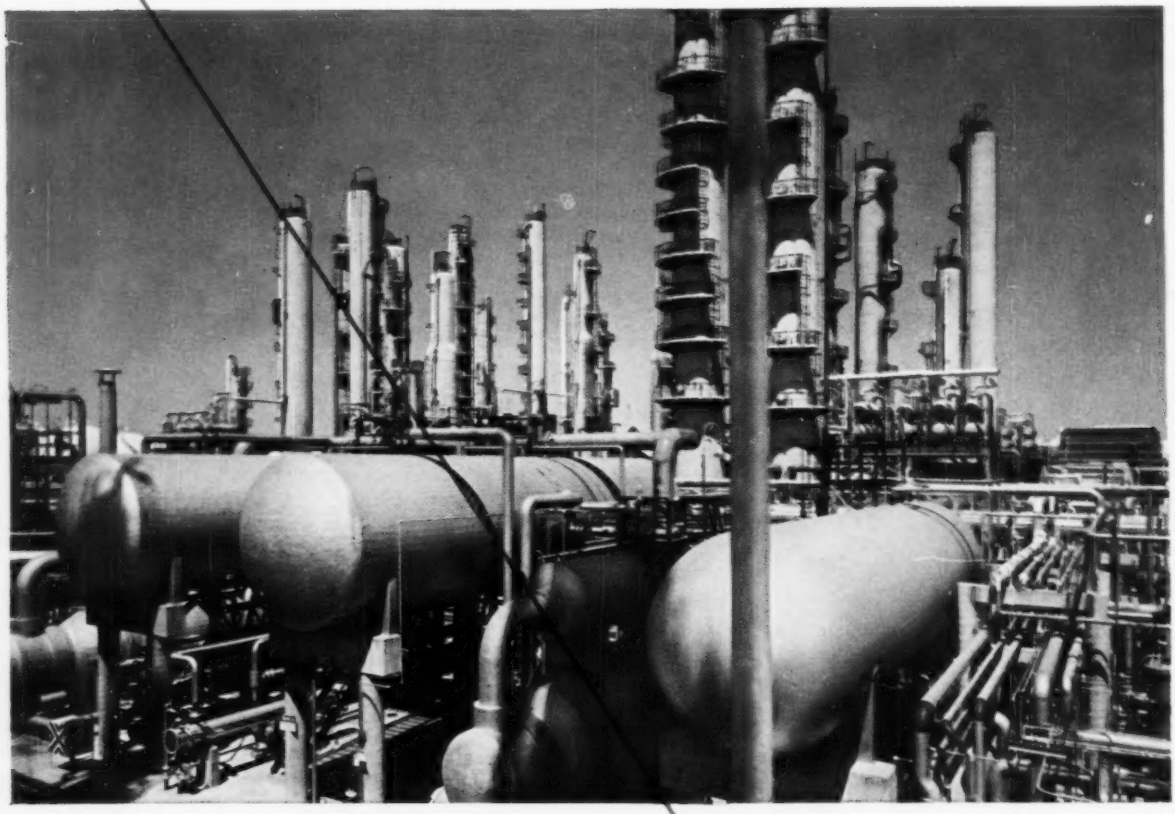


SALES AND SERVICE INTEGRATION recognizes kinship of one to the other. One man administers both.

ADJUSTABLE ROLLER MAIN BEARINGS feature low friction losses which help to extend compressor life.

AIR CONDITIONED GAUGE ROOM has master gauge blocks constantly used to check instruments.

tank-car delivery of DIISOBUTYLENE



Now in its third successful year of volume production, this Petro-Tex trimethylpentene finds important use in detergent intermediates, anti-oxidants, etc. But its reaction possibilities—such as chlorination and hydrolosis to isooctenyl alcohol—are far from fully explored.

Petro-Tex Diisobutylene has a uniquely interesting combination of properties. It is a clear water-white mixture of

2,4,4-trimethylpentene-1 $H_3C-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-\overset{\overset{CH_3}{|}}{C}=CH_2$

and 2,4,4-trimethylpentene-2 $H_3C-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}-\overset{\overset{H}{|}}{C}=\overset{\overset{CH_3}{|}}{C}-CH_3$

TECHNICAL DATA "PACKAGE" AVAILABLE

To expedite end-product research, we offer a complete technical "package" containing detailed physical properties plus a breakdown of the isomer distribution and their concentration. Our technical personnel will work with you on new applications which may lead to volume use. We also invite inquiries for

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ISOBUTYLENE **n-BUTENE-1** **n-BUTENE-2**

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3M's Beutow gives matched, consolidated statements for fairness.

Building Up Balance Sheet

Last week Minnesota Mining and Manufacturing Co. became the latest CPI firm to consolidate the financial figures of its foreign subsidiaries with those of the domestic company. Reason for the move: international operations are now deemed important enough to warrant representation as part of over-all company figures—not merely to serve as financial footnotes.

Company President Herbert Beutow explained to stockholders at 3M's annual meeting that "We think [you're] entitled to as much information as we can give [you] and certainly the volume of sales and profits generated by our foreign business is a significant feature in our over-all results."

Other firms have also recently adopted this consolidation technique. Monsanto Chemical, for one, reported its first-quarter '60 earnings in this manner, at the same time updating last year's figures for comparison purposes. Monsanto's revision points up one difference this accounting device can make on the financial sheet: it shows 10¢ more net income on each of Monsanto's 23 million common shares outstanding. Says Monsanto, "This method better portrays the total interest of Monsanto shareowners."

Other Views: Such reporting is on the upswing generally throughout industry. Professional stockholder and annual-report critic Lewis Gilbert tells CHEMICAL WEEK, "Of course it's a trend; more and more companies are doing it. And whatever else it may do, remember it makes the picture look so much rosier."

Gilbert believes that inclusion of foreign operating figures—other than money actually remitted to the U.S.—often provides an easy way to jack up slipping profit margins. As an example he cites the case of a leading soap company whose chairman was under pressure because of his firm's poor profit picture and excessive executive turnover. One of the first "gimmicks" this man used to convey a rosy view of his administration, says Gilbert, was to pull the foreign consolidation rabbit out of the hat.

But most firms use the technique for more worthy reasons, not to mislead stockholders. Companies surveyed by CHEMICAL WEEK think that consolidating figures makes the stockholder more aware of his total interest in the company, gives him a fairer picture. Perhaps anticipating just such criticism as Gilbert offers, Beutow described the operating picture both with and without total foreign operations so 3M stockholders could see "there was no intent to 'puff' them by consolidating foreign subsidiaries" into the over-all report.

Other Moves: Consolidation of overseas financial data in over-all operating figures is certainly not a new technique. Prior to World War II the method was common practice, but it disappeared during the international confusion created by the war. Now, with American firms increasing business in Europe, Asia and South America, more and more companies are expected to follow suit. Some, like Dow, have been consolidating figures for years.

The dozen other companies surveyed that have extensive international holdings vary their methods of reporting on the value of wholly or partly owned foreign subsidiaries. Du Pont, Olin Mathieson, Reichhold and Union Carbide, for instance, report as part of their consolidated balances only profits, dividends and royalties actually remitted to this country from the overseas subsidiaries or operations.

Other companies—such as Merck and Koppers—consolidate figures only for wholly owned subsidiaries abroad, except where monetary restrictions distort the operating picture. Vick Chemical normally consolidates only remittances, but makes an adjustment in its consolidated earnings to include foreign operations.

Most companies indicate that their method of handling foreign income is pretty much a matter for accountants to settle; few have definite plans about this year's reports. Chances are, they say, that within the next few years an increasing number of firms will take the view that consolidation of foreign figures can be effective in stockholder relations.

CW PHOTOS—DOUG KIRKLAND

Flying saucer, shown at Princeton, illustrates inventiveness that is vital adjunct to research.

Junior Scientists See Ideas in Action

To their pleasure and surprise, 125 outstanding high school science students discovered last week that research is definitely not the province of a wild-eyed social recluse. They found it can involve a heady mixture of profound academics, lively business activity and dramatic invention.

The students learned all this in and around Princeton, N.J., via a unique "Chemical Caravan" that took them on a one-day excursion through research facilities at Princeton University and chemical firms, including American Cyanamid, Union Carbide, Food Machinery and Chemical. The caravan was sponsored and organized by the Chemical Industry Activities Committees of New York and New Jersey, which invited high schools in or near communities where chemical plants are located to send along outstanding college-bound juniors and seniors who are taking chemistry.

At Princeton the students met Professor John Turkevitch, head of the University's chemistry department, who is scheduled for a two-month stint this summer as the first scientific attache to the U.S. Embassy in Moscow. In dramatic terms, he described for them the academic researcher's function—as a discoverer, a teacher and a public servant.

Out at the university's James Forrestal Research Center, the students saw "flying saucer" Ground Effect Machines in action, visited the Project Matterhorn — a mammoth laboratory experiment in the control of nuclear fusion — now under construction. At lunch, Celanese Chemical Co. President Richard KixMiller explained how business and research work hand in hand. The remainder of the trip

Eloquent Professor John Turkevich described researcher's function.

Fusion stellarator under construction showed role of mammoth experiment in research, provided contrast with less-dramatic industrial chemistry labs.

ADMINISTRATION

consisted of visits to nearby chemical laboratories.

CIAC organized the trip over a three-month period, spent about $1,500 to bring it off. Result: an exciting, informative day for students that showed how scientists see life breathed into their ideas.

New Waste Decision

Companies that discharge solid industrial wastes into waterways maintained by the federal government can take warning from a U.S. Supreme Court decision last week. The court ruled that three steel companies were responsible for clearing channels they had obstructed with such discharges.

The court's 5-4 ruling reverses a decision last year by the seventh circuit court of appeals. The prior ruling said the government had no legal right to compel the three companies —Republic Steel Corp., International Harvester Co. and Interlake Iron Corp.—to pay for dredging operations in Calumet River near Chicago.

The Supreme Court ruling says the industrial deposits placed in the river by the companies created an "obstruction" and that the Chicago federal district trial court—where the original case was tried—has authority under the act to order the relief requested.

LEGAL

Buffalo Tax: The New York state court of appeals has upheld an appelate court ruling that Allied Chemical Corp. should recover $22,321 in utility tax money paid the city of Buffalo. This winds up a two-year-old test of industry's liability for the 3% tax the city levies on the use of gas, water and electricity.

The appeal was initiated by Allied when a lower court ruled that utilities used for domestic, industrial or commercial purposes were subject to Buffalo's consumers utility tax. The city has been collecting the tax since July 1, '54. Allied maintained that industrial uses of the utilities did not come under the tax, that the enabling act—permitting imposition of the tax—confined it to "domestic or commercial use" only, not to industrial use.

The total refund to industry in the area may exceed $1.5 million. Some 20 other claims are pending.

Get Sodium Bicarbonate in the grain size you need every time...

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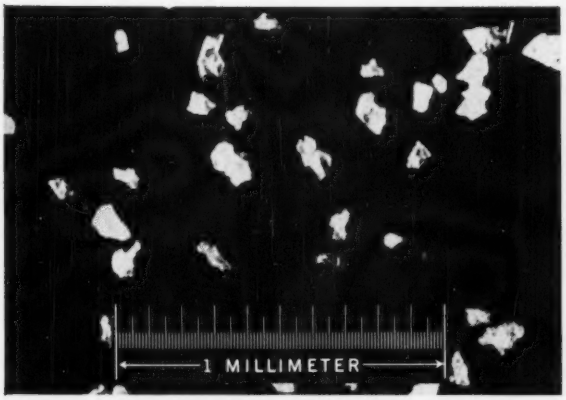
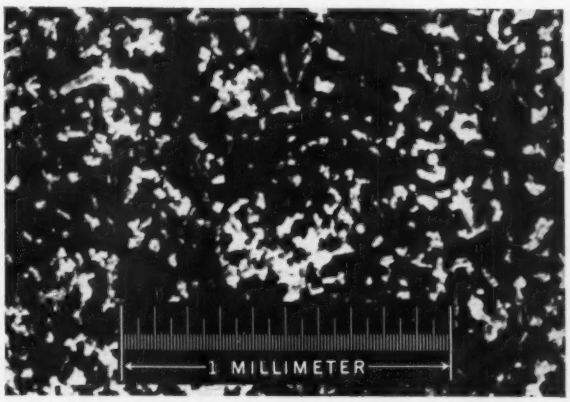


Sodium Bicarbonate U.S.P. Powdered No. 1—For general purpose use in chemical processing, dyestuffs, adhesives, starches, textiles and industrial applications.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

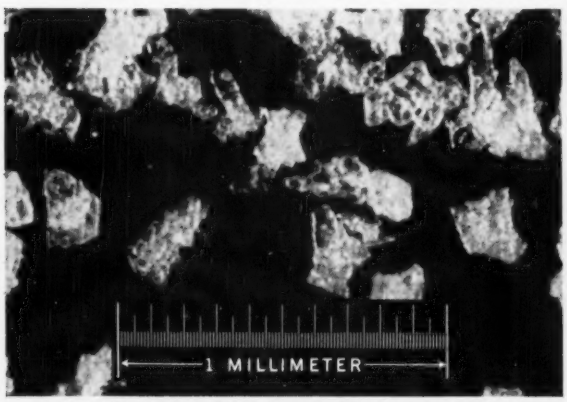
42 Mesh	Trace	200 Mesh	35.0%
100 Mesh	5%	325 Mesh	70.0%
170 Mesh	20.0%	400 Mesh	80.0%



Sodium Bicarbonate U.S.P. Fine Powdered No. 3DF for use specifically in dry powder fire extinguisher mixes, also in rubber and plastics blowing, lubricant for sheet vinyl.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

170 Mesh	Trace	325 Mesh	25.0%
200 Mesh	2.0%	400 Mesh	45.0%



Sodium Bicarbonate U.S.P. Granular No. 5 for use in effervescent salts, other pharmaceuticals and special types of cleansers.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

42 Mesh	Trace	100 Mesh	92.5%
65 Mesh	27.0%	170 Mesh	99.0%
80 Mesh	66.5%		

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TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

42 Mesh	Trace	200 Mesh	35.0%
100 Mesh	5%	325 Mesh	70.0%
170 Mesh	20.0%	400 Mesh	80.0%

Are you getting sodium bicarbonate of the specific grain size for optimum results in your process or for maximum shelf life and performance of your products? You can eliminate doubts by specifying Church & Dwight. This simple step will assure you of obtaining the widest selection of grain sizes available because Church & Dwight is the country's largest supplier of Sodium Bicarbonate U.S.P. You'll also receive for the asking unmatched technical service based on more than 100 years of experience with sodium bicarbonate. Unusual grain size requirements are given special attention. Try us and see.

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ADMINISTRATION

LABOR

Canadian Pact: Management at Imperial Oil Co.'s Vancouver, B.C., refinery and the Oil, Chemical & Atomic Workers International Union have agreed on a new one-year contract retroactive to Jan. 15, '60. Agreement calls for a new minimum wage of $1.87/hour and a maximum of $2.99 effective last March 1. The contract also liberalizes seniority provisions, revises maintenance of pay when the plant is shut down for inspection, and makes other adjustments and language clarifications.

•

3M Settlement: Some 450 striking employees of two Minnesota Mining and Manufacturing Co. plants at Hartford City, Ind., have returned to work after settlement of a three-year contract giving wage increases averaging 25¢/hour. The employees are represented by Local 186 of the Pulp, Sulphite and Paper Mill Workers union.

KEY CHANGES

Hayden B. Kline to chairman of the board and **Frederick L. Bissinger** to president, Industrial Rayon Corp. (Cleveland).

A. K. Walton to chairman of the board and **Paul G. Carpenter** to president, Copolymer Rubber & Chemical Corp. (New York).

Nelson M. Loud and **Richard M. Mansfield** to board of directors; **Leonard A. Scheele, Philip A. Singleton, George P. Maginness, P. R. van der Stricht** and **Pierre A. deTarnowsky** to senior vice-presidents; **W. S. Lasdon** to chairman, executive committee; **J. D. Miller** and **Frank Markoe** to vice-presidents; all of Warner-Lambert Pharmaceutical Co. (Morris Plains, N.J.).

T. G. Gibian, R. L. Haden, J. G. Mark, E. L. Mears, J. W. Miller to vice-presidents, Dewey and Almy Chemical Division and **F. G. Kingsley** and **E. W. Pyne** to board of directors, parent company, W. R. Grace & Co. (New York).

DIED

Marlin G. Geiger, 63, executive vice-president and director, W. R. Grace & Co., while on a business trip.

Employee Gift Matching

Another Good Way To Help Our Colleges And Universities

The business community continues to make an impressive record in giving badly needed financial help to our colleges and universities. This year the Council for Financial Aid to Education expects that business contributions to higher education will be well over four times their total of about $40 million a decade ago.

If these contributions, which were about $150 million last year, continue to increase at the present rate, they will hit the target of $500 million set for business aid to our colleges and universities in 1970. This is the amount which, the Council calculates, must come from business if these institutions are to have the money to do their job properly a decade hence.

However, it would be a fine thing both for the nation and the business community if that $500 million dollar target were hit well before 1970. This would put us ahead of a schedule (it is a conservative schedule) in getting on top of what remains one of the nation's most crucial problems—that of having its colleges and universities adequately financed which they are very far from being right now.

There is, we believe, one quite simple way by which financial support for higher education by business firms might be considerably speeded up. All that is required is that business firms generally abandon the idea that it is possible for every company to have a program to provide such support that is novel and distinctive, and that this is the only way that interests of prestige and good public relations can be served.

There are nowhere near enough good plans to provide financial help for higher education to equip even a small percentage of our business firms with one that is novel and distinctive. Also **there are a number of very good plans which, so far as we can tell, lose nothing of their value for prestige and good public relations by being used by a large number of companies.**

The Gift Matching Idea

One plan with these attractive characteristics is the plan by which companies match the gifts of their employees to colleges and universities, and now increasingly gifts to independent secondary schools. So far as we can discover the general plan was invented by the General Electric Company, with what it calls its Corporate Alumnus Program. Now, with variations on the same basic design, almost 100 companies have gift matching plans. We at McGraw-Hill are included in this number.

The gift matching plans vary considerably in detail. Some are limited to alumni of the schools to be benefited. In others any employee can participate by making a gift to an eligible institution. There are also variations in the maximum amounts of gifts by individuals and to individual institutions which will be matched. Some companies have "open end" plans; others limit the total to be matched in any one year. All of the plans, however, embody the same central gift matching idea.

When the plan was first launched some college administrators of little faith in the fundamental generosity of the alumni and friends of their schools expressed the fear that if gifts were to be matched they might be made smaller in the first place. The opposing view was that the possibility of having them matched would stimulate more and larger gifts.

Advantages Of Gift Matching

So far as we have been able to discover, the expectation that giving would be stimulated by gift matching has been validated by the experience with the plans. This has been our experience at McGraw-Hill. Some other important virtues of the gift matching programs have been summarized by

LEADERS OF SOME OF THE INSTITUTIONS WHICH HAVE SHARED IN THE McGRAW-HILL EMPLOYEE GIFT MATCHING PROGRAM EXPRESS THEIR VIEWS

"We particularly appreciate the fact that your grant is unrestricted, and can therefore be used for our area of greatest continuing need — the General Education Fund, from which faculty salaries come."

W. Boyd Alexander, Vice President and Dean of the Faculty
Antioch College

"We are grateful, not only for the financial support given to The Cooper Union by your company, but also for the stimulus it has provided our alumni in your employ to make annual gifts to their Alma Mater."

Edwin S. Burdell, President
The Cooper Union

"The gift matching program has a dual advantage. First, it acknowledges and repays a debt of honor to those colleges which, often at great loss to themselves, have trained and educated the men who are now among your personnel. This is most fair and equitable. Secondly, by offering to match up to a given limit the contributions of alumni, you encourage support of their own colleges on the part of graduates, who themselves are so indebted."

President Edward B. Bunn, S. J.
Georgetown University

"Thanks to your doubling of the annual gifts of one of our generous and loyal friends who works with you at McGraw-Hill, we are well on the way toward creating what for us will be an extremely helpful scholarship fund. This would not have been possible without the gift matching program."

C. Adrian Heaton, President
California Baptist Theological Seminary

Ernest T. Stewart, Executive Director of the American Alumni Council (1785 Massachusetts Avenue, N.W., Washington, D.C.) who would be glad to provide detailed information about them, and the names of companies having such plans. Of the gift matching idea he says,

> *"First*—it assures the corporation that its gifts go direct to those colleges and universities which have furnished it with trained manpower.
>
> *"Second*—it places responsibilities for the gifts on the institutions themselves and drives home the point that they must make a real effort with their own alumni.
>
> *"Third*—it leaves the final decision of corporate support basically to the employees."

For many companies which are fearful of complicating their relations with their customers by courting charges of favoritism if they provide direct financial support for any particular school or group of schools, this latter consideration can be of decisive importance.

The gift matching plan also has what for many companies is the very important virtue of being simply and easily administered. Some additional virtues of the gift matching plan, as seen by officers of institutions which have been beneficiaries, are indicated in the box at the top of this page.

Effective And Easily Managed

We at McGraw-Hill are well pleased with our gift matching program. It is a broad program in which all employees and a wide array of colleges and universities, both privately and publicly supported, are eligible to participate. We commend it as an effective and easily managed plan to provide urgently needed financial aid to higher education.

We also urge that business firms adopt this or one of a number of other very good programs of financial aid to higher education* rather than delay in the hope of hitting upon some quite new and distinctive plan. There are very long odds that such delay will prove unavailing. In the meantime our colleges will be losing financial help which it is profoundly in the interest of the business community and the nation to see that they get—and get fast.

*An earlier editorial in this series dealt with tuition supplements as another good way to help our colleges and universities. Reprints of this editorial are available. So are copies of a "more or less socratic dialog," entitled, **A Business Wrestling with the Problem of Aid to Colleges and Universities.** It was prompted by the efforts of McGraw-Hill to find suitable methods of providing financial aid to higher education.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C. McGraw
PRESIDENT
McGRAW-HILL PUBLISHING COMPANY, INC.

PERIODIC CLASSIFICATION OF THE ELEMENTS

GROUP	I_a	II_a	III_b	IV_b	V_b	VI_b	VII_b	$VIII_b$			I_b	II_b	III_a	IV_a	V_a	VI_a	VII_a	$VIII_a$
PERIODS 1	H																	He
2	Li	Be											B	C	N	O	F	Ne
3	Na	Mg											Al	Si	P	S	Cl	Ar
4	K	Ca	Sc	Ti	V	Cr	Mn			Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
5	Rb	Sr	Y	Zr	Nb					Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
6	Cs	Ba	La	Hf	Ta					Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
7	Fr	Ra	Ac															

	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	

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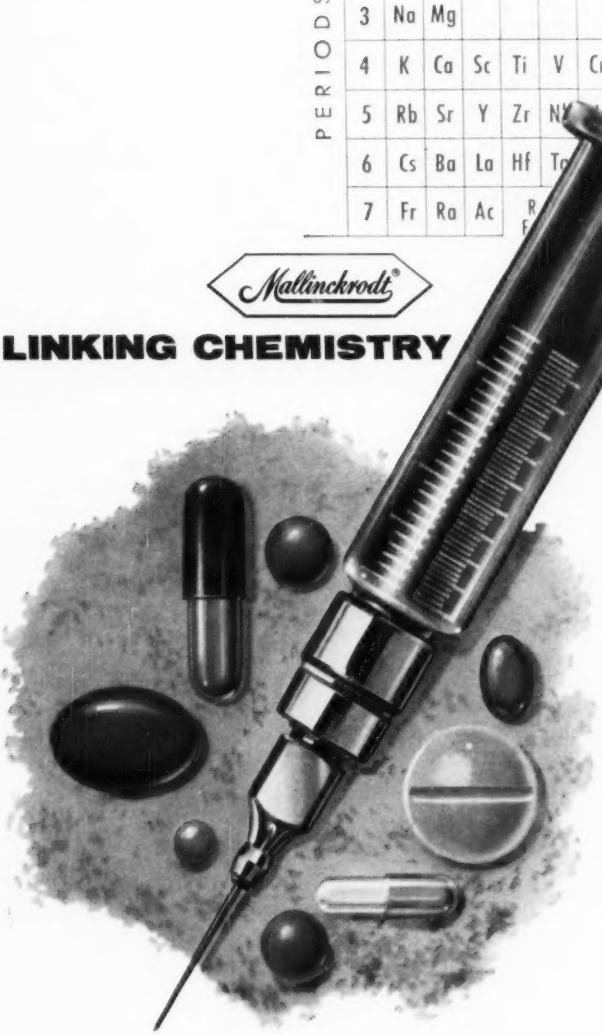

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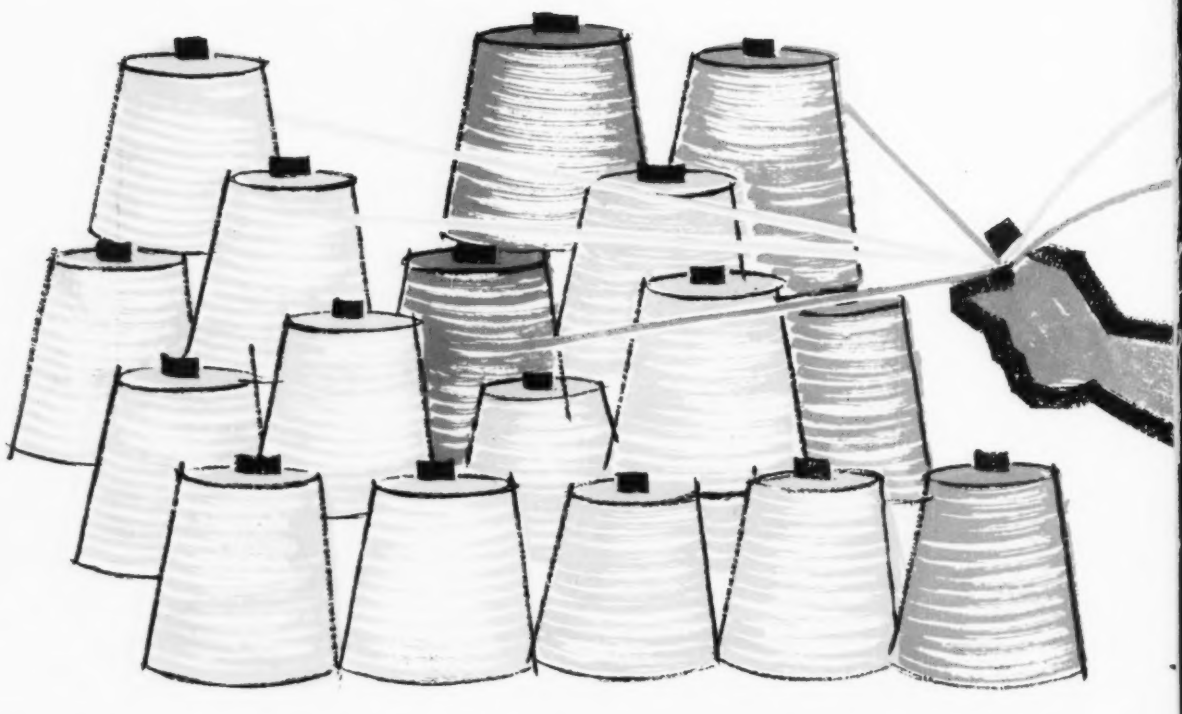
TODAY WE MEET OUR STANDARDS—TOMORROW WE EXCEED THEM. AFTER 92 YEARS, IT'S A HABIT.

chemicals on the move...in textiles



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Market Newsletter

CHEMICAL WEEK
May 28, 1960

A practical way out of the ammonium sulfate surplus situation that plagues coke producers of the by-product material (*CW, May 21, p. 92*) was suggested last week by Chester Edwards, president of Nitrogen Products (New Brunswick, N.J.), at a meeting of the American Coke and Coal Chemicals Institute at Rye, N.Y. His formula: switch from solid ammonium sulfate to production of coke-oven ammonia liquor.

The surplus of by-product ammonium sulfate is actually greater than coke-oven production data indicate, said Edwards. Stocks of coke-oven sulfate were more than 150,000 tons at the end of last March, compared with 118,000 tons at the same time in '59—this despite a low 620,000 tons output last year because of the steel strike.

But Edwards notes that much of so-called synthetic ammonium sulfate should actually be considered by-product material because it is also made from by-product sulfuric acid; adding the two sources together puts estimated total production at 1.42 million tons of by-product. (Only remaining producers of true synthetic sulfate east of the Rockies are Phillips Chemical at Houston, Tex., and Northern Chemical Industries at Searsport, Me.

Exporting excess ammonium sulfate isn't the answer, according to Edwards. Reason: use of ammonium nitrate and urea is growing—in preference to ammonium sulfate—in world markets. Consequently, there's a real need to find better domestic outlets; and this, he suggested, could best be done if some producers seriously considered making ammonia liquor instead of the sulfate.

Such a move is encouraged by increasing interest in use of ammonia liquors for fertilization; also earnings, according to Edwards' calculations, favor liquor over solid ammonium sulfate.

Edwards summed up these advantages in production of 30% ammonia liquor: (1) the potential market is big enough to absorb excess coke-oven ammonia; (2) purchase and use of sulfuric acid would be eliminated; (3) a more concentrated nitrogen product would be obtained; (4) a liquid product would be easier to handle and would be cheaper to store.

Although Edwards did not discuss the technology required to switch coke-oven output from ammonium sulfate to ammonia, one possibility lies in a newly developed Inland Steel Co. process keyed to an ammonium bisulfate solution that can be regenerated and recycled (*CW, April 16, p. 104*).

•

Should the U.S. Tariff Commission continue to report synthetic organic chemical markets data? "Yes," says the Chemical Market Research

Assn., whose board of directors last week unanimously voted in favor of leaving the job in the hands of Tariff, as opposed to a suggested shift to the Bureau of Census (*CW, May 7, p. 83; Nov. 7, '59, p. 33*). The association's official view—which mirrors the opinion of CMRA's 690 members representing 200 CPI firms—reflects strong opposition to the talked-about change.

Reasons for the stand, as cited by CMRA's president, James Sayre: Tariff has many decades of experience in handling the complex statistical problem of reporting organic chemicals data; its staff includes a group of commodity experts whose knowledge is of great help in handling and interpreting difficult data; transfer of the function would result in drastic curtailing of the volume of listings, resulting in a "great disservice to the chemical industry."

•

Plastics makers may have a new weapon to aid them in their battle to win a larger share of the giant building construction materials market. Arthur D. Little, Inc. (Cambridge, Mass.) disclosed last week it's planning to launch a three-year, $1.5-million market development effort to boost plastics' role in building.

Right now Little is seeking sponsors for its ambitious project. Main target of their solicitations: raw-material suppliers. Cost: $150,000 per company for the three-year program. Little wants to sign up "at least 10, but not more than 15, sponsors."

•

Price of anhydrous ammonia is going up on the West Coast. Hercules Powder is posting price increases on anhydrous ammonia fertilizer, moving tabs to the following schedules from the current $66/ton: $69/-ton, Aug. 1; $72/ton, Oct. 1; $75/ton, Jan. 1, '61. Prices are f.o.b. Hercules, Calif.

There was no immediate reaction from Shell Chemical, major West Coast ammonia producer, which established the $66/ton price in fall of '58 with a drastic 25% cut; Shell's action at that time came on the heels of announced intention of Best Fertilizer to beat the '59-60 off-season slack by posting a $63/ton tag (*CW Market Newsletter, Nov. 1, '58*).

•

Sulfuric acid production has begun at a new and expanded sulfuric acid plant of Pittsburgh Chemical—new subsidiary of Pittsburgh Coke & Chemical—at Neville Island, Pa. The expansion will boost Pittsburgh Chemical's sulfuric capacity 70%.

SELECTED PRICE CHANGES—WEEK ENDING MAY 23, 1960

UP	Change	New Price
Copra, Atl., Gulf ports, c.i.f., ton	$2.50	$200.00
Tin metal (Straits), lb.	0.01	1.00

All prices per pound unless quantity is quoted.

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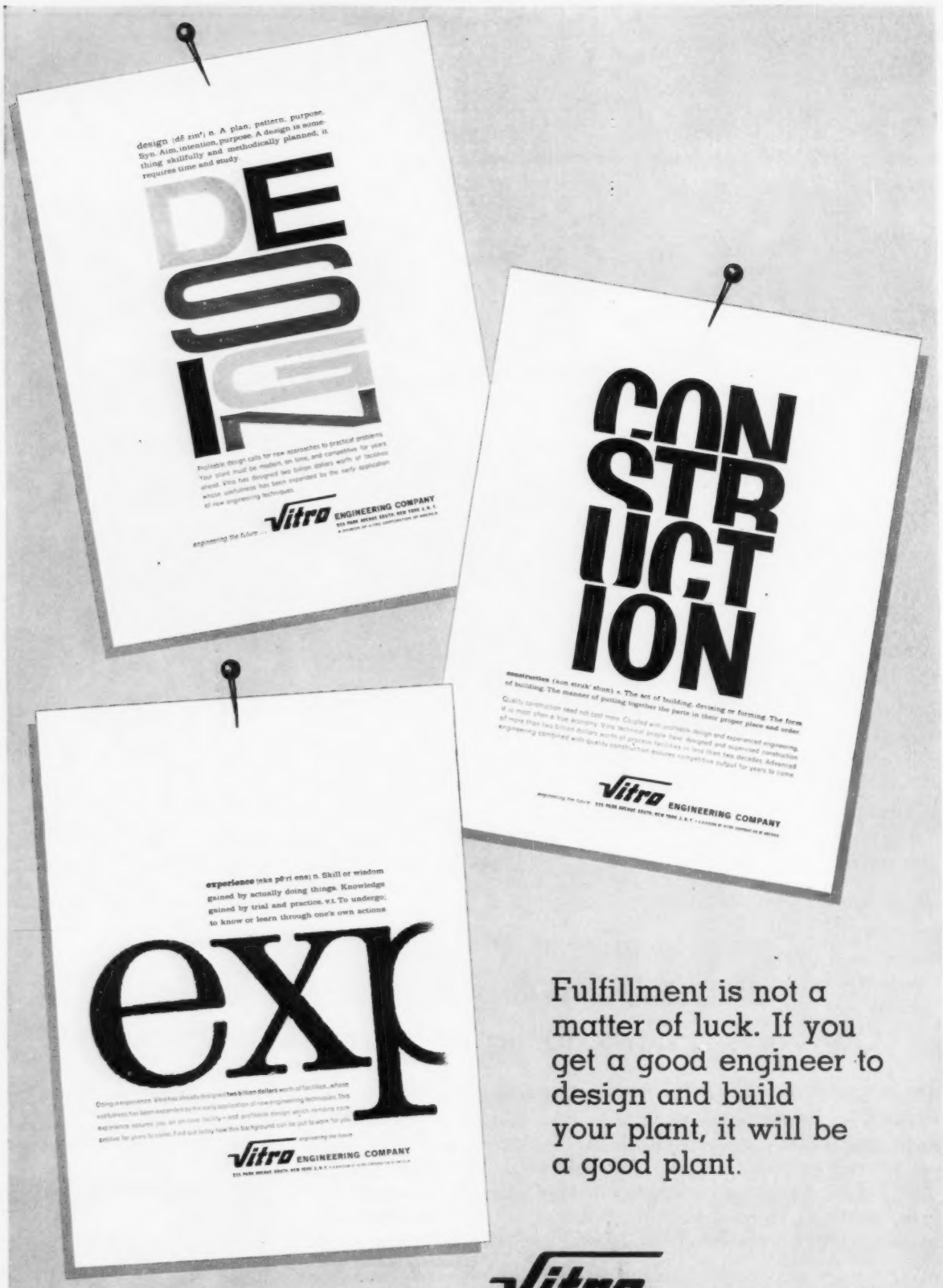

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Game theory: Three steps size up product's chance of success

Step 1—***Key characteristics of new product and leading commercial competitors are arbitrarily rated from excellent (10) to extremely poor (0).***

	Freeze-Thaw Stability	No Lap Marks	Leveling	Crayon Stain Removability	Water Spot Resistance	R.M. Cost	Odds	Value
SRC Paint Formulation	10	8	8	4	5	8	7	5.6
Commercial Paint A	10	7	7	2	6	7	1	5.6
Commercial Paint B	10	4	5	7	6	8	11	5.6
Commercial Paint C	4	7	7	1	4	7	0	4.3
Odds	0	5	0	3	11	0		
Value	10	5.6	6.2	5.6	5.6	8.3		

Step 2—***Competitive product inferior on every point is eliminated from consideration.***

	Freeze-Thaw Stability	No Lap Marks	Leveling	Crayon Stain Removability	Water Spot Resistance	R.M. Cost	Odds	Value
SRC Paint Formulation	10	8	8	4	5	8	7	5.6
Commercial Paint A	10	7	7	2	6	7	1	5.6
Commercial Paint B	10	4	5	7	6	8	11	5.6
Commercial Paint C	4	7	7	1	4	7	0	4.3
Odds	0	5	0	3	11	0		
Value	10	5.6	6.2	5.6	5.6	8.3		

Step 3—***Elimination of strong characteristics provides statistical decision based on properties that would be most critical under adverse conditions.***

	Freeze-Thaw Stability	No Lap Marks	Leveling	Crayon Stain Removability	Water Spot Resistance	R.M. Cost	Odds	Value
SRC Paint Formulation	10	8	8	4	5	8	7	5.6
Commercial Paint A	10	7	7	2	6	7	1	5.6
Commercial Paint B	10	4	5	7	6	8	11	5.6
Commercial Paint C	4	7	7	1	4	7	0	4.3
Odds	0	5	0	3	11	0		
Value	10	5.6	6.2	5.6	5.6	8.3		

Playing the Odds Boosts Project Payoffs

At last week's 17th national meeting of the Operations Research Society of America in New York's Statler Hilton, Shawinigan Resin Corp.'s Herbert Terry described a game theory approach (*above*) developed especially for coping with the complex problem of selecting new projects and new products with the best chances of commercial success.

The use of the game theory arises out of a twofold need, says Terry: (1) a better method of selecting research and development projects—particularly in cases where such decisions influence large capital investments; (2) a reliable technique of evaluating the probable acceptance of new products manufactured for sale or developed as a customer service.

Mathematical methods are not, of course, a substitute for sound management judgment. But they are a valuable supplement to judgment, help to spot

potentially critical factors, which may be overlooked by purely intuitive reasoning processes.

Predicting Acceptance: The chart (*p. 97*) illustrates how Shawinigan employed game theory to predict acceptance of a basic paint formulation designed around a new polyvinyl acetate emulsion it had developed in its Springfield, Mass., research laboratory. This simplified example (Shawinigan's actual study involved the comparison of nine paints against 17 properties) demonstrates how game theory works, not only for product evaluation but also for project decisions.

The first step was to rate each property of each paint, using the familiar scale ranging from 10 for excellent to 0 for extremely poor. Terry recommends this method over weighted ratings, which are finally totaled to determine the product with the highest score. Under this system, factors are assigned different maximum values according to their assumed relative importance.

Weighting of factors is wasteful, says Terry, because the relative order of scores is not significantly affected by changes in the relative weights; it is misleading to assume that the scores reflect the effects of the weights.

For example, the highest-scoring product may have a lower rating in one property than another product with a slightly lower score. If that single property turns out to be the most critical factor, the high-scoring evaluation may be useless. "A project doesn't have to be shot, stabbed and poisoned to become very dead," says Terry. "Weakness in just one factor can be fatal." A study of several unsuccessful projects shows that the factors that caused them to fail had been evident early in the development stage, but were discounted as unimportant because so many other factors were favorable.

A safer approach to decision-making in the face of uncertainty, he adds, is to assume that the worst will occur, regardless of the final choice. Then, make the choice that will assure the best return under that assumption.

Shawinigan's second step in the paint evaluation problem was to eliminate the commerical product (*paint C in the chart*) considered inferior to its developmental material in every property. This step removed the "soft" competitors, put the SRC formulation up against only those offering the strongest competitive features.

The third step was to eliminate the dominant properties—those columns that contained high ratings for all three paints. In keeping with the assumption that the worst will happen, this step bases the decisions on the most critical properties—lapping, stain removability and spot resistance—any of which would cause consumer dissatisfaction, regardless of which paint was selected.

At this point, standard mathematical techniques were employed to obtain the "odds"—indicative of the relative frequency with which a particular paint would be chosen. Similarly, a "value" was calculated, indicating how consumers would rate each paint if a poll were taken.

The solution to the game indicated:

(1) The total number of complaints on any of the three paints in the solution will be the same, regardless of the reason for the complaint.

(2) Users of paint C run a risk of obtaining less performance satisfaction than they would with the others.

(3) If the most potentially critical properties were not important to a consumer, his satisfaction would be greater because all of the properties not in the solution rated higher than 5.6.

Proved in Practice: The performance prediction alone can't determine the actual sales pattern of a product, says Terry. Distribution, advertising and services are also vital factors. However, buoyed by the game theory prediction that the new formulation would stand a good chance of being adopted by paint companies seeking improved performance, Shawinigan decided to put it on the market.

Instead of its usual procedure—offering a new emulsion together with a suggested starting formulation—the company introduced the new material in the form of a compounded paint for field evaluation. Acceptance over the past 18 months has confirmed the results of the analysis provided by the game theory approach; a number of companies went into production on the basis of the information as originally supplied.

Technical Guidance: The game theory can also be a valuable aid to technical management men in all stages of project decision-making—from the initial selection of suitable exploratory research projects through to the final selection of projects for full-scale commercial production. In this area managerial judgment is important in assigning values to the various factors to be considered. Unlike physical properties of a product that can be rated quantitatively, many qualitative judgments are required in rating such project factors as rate of technological change, reliability of process know-how, etc.

In many cases, says Terry, a game theory solution in project planning will be in the form of a mixed strategy. That is, the solution not only selects the best project prospects but also points out the critical factors on which each choice is based. This enables the project planner to use the game solution in one of two ways:

(1) He can select just one project on the basis of the determined odds, as with a table of random numbers.

(2) He can invest in all of the chosen projects, dividing available funds in proportion to the determined odds.

The game theory may also be helpful in pinpointing specific areas in which a small amount of concentrated development might be applied to enhance a project's over-all rating. For example, if two promising processes differed only slightly in one critical factor, such as reliability of process know-how, an added investment in engineering research on the lower-ranking project could yield sufficient data to boost its chances of selection and eventual commercial success.

By selecting the factors that would be most critical under the poorest conditions, says Terry, the game theory solution assumes a minimum—or floor—below which a project cannot go. Any improvement in a critical factor raises this floor.

This approach isn't a panacea for all the problems of project evaluation and selection, says Terry. Its greatest value lies in the insight it provides into the assumptions and logical implications involved in comparative ratings of products and processes.

In the face of increasing business complexity, chances are that more CPI management men will be enlisting mathematical aids to help take the guesswork out of key management decisions.

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In spite of its size and the complexity of the engineering problems involved, Badger completed Atlantic's plant in less than fourteen months. This project is another example of how Badger engineering skill helps leading companies get more efficient, economical plants. Isn't this the type of service you deserve?

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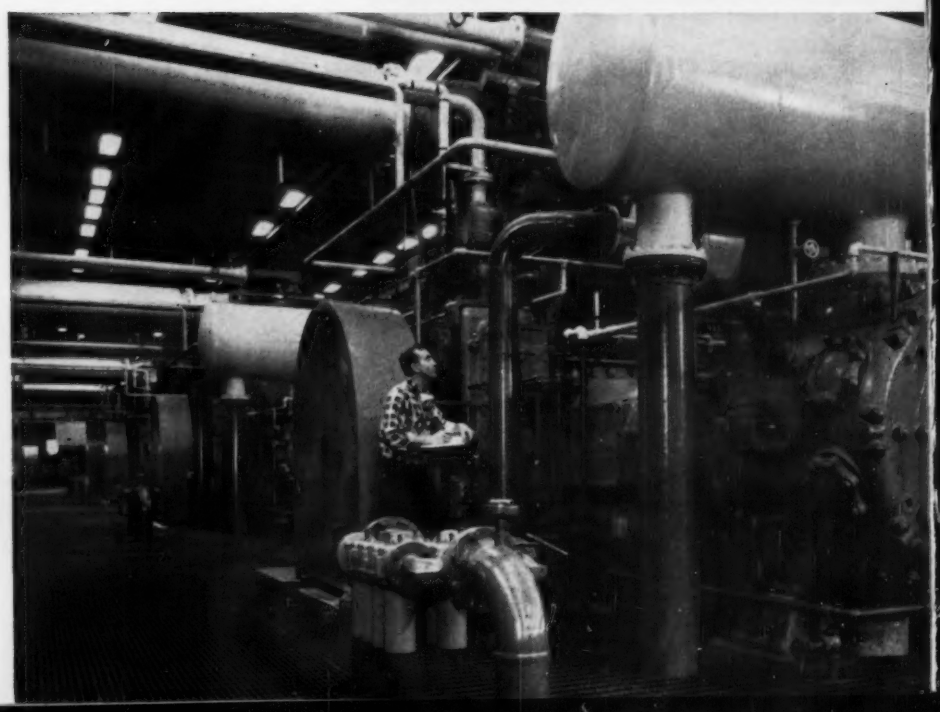
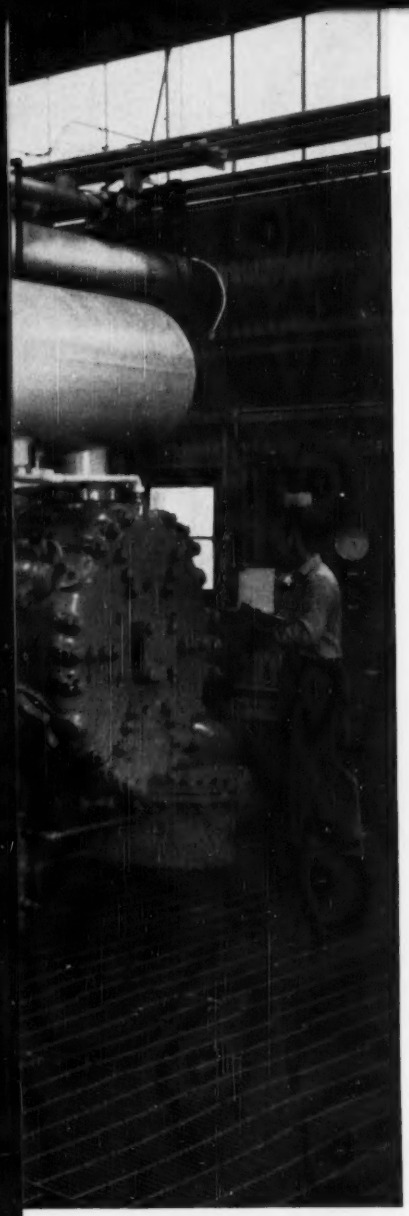
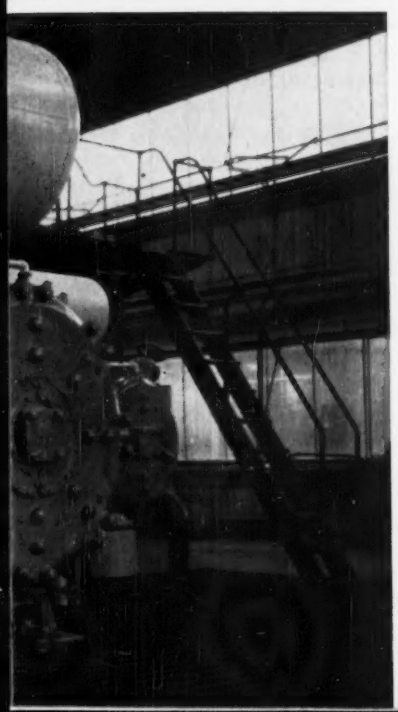
Badger (France) S. à R.L., Paris, France

Cooper-Bessemer compressor shown is one of two units for compression of synthesis gas.



View showing the four Cooper-Bessemer compressors. Unit in foreground is for "mixed gases" (air, nitrogen and methane).





Henry LaRue, *Ammonia Area Superintendent, Spencer Chemical Company, Vicksburg, Mississippi explains...*

How we compress four different gases with a team of four Cooper-Bessemer compressors

"Our entire ammonia plant depends on the uninterrupted flow of component gases, compressed by four Cooper-Bessemer GMW-8 Compressors," reports Mr. LaRue. "These four 2000 hp gas engine driven units have been the heart of our system 24-hours a day, day in and day out, since 1953.

"Two of the compressors, with five cylinders each, compress three different gases... air, nitrogen and methane. The other pair of compressors pump a synthesis gas mixture of hydrogen and nitrogen.

"Despite their 'round-the-clock operation for seven years, none of these Cooper-Bessemer compressors has had a major down-time for maintenance. They represent a sound investment."

Cooper-Bessemer engineers are at your service to help you plan compression and power facilities. Call the nearest office.

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THE BLEACH THAT WOULDN'T STOP TURNING RED

(Another Diamond Alkali Success Story on Chlorine and Caustic Soda)

One of Diamond's customers was a manufacturer of laundry products and cleaners. He figured he could make his business larger by going into the laundry-bleach business.

After some investigation, he assembled equipment, ordered chlorine and caustic soda, and ran his first batch. It turned red, as did every other batch he ran.

A Diamond technical man was called in to run down the trouble . . . traced it to scale in a used heat exchanger. He showed the plant staff how to prepare equipment for handling caustic soda and chlorine, suggested improvements in their setup, helped get the process running smoothly.

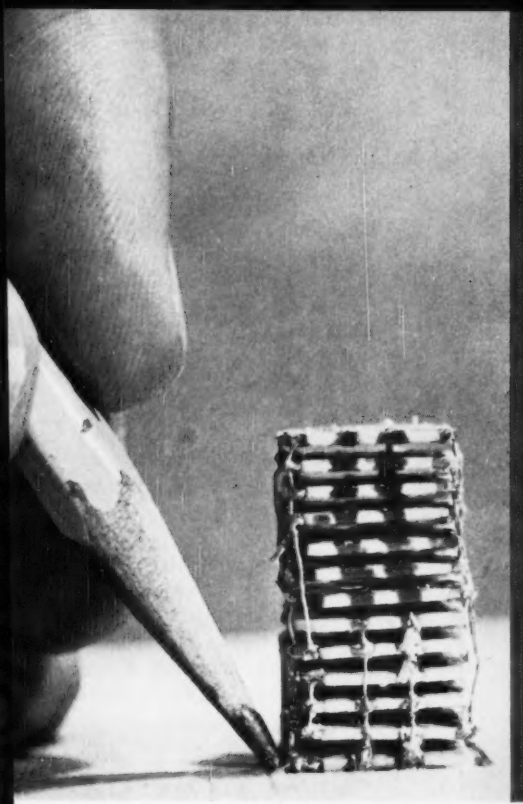
If *you* use caustic soda, get to know the Diamond technical man. He not only saves customers money on shipping and handling problems, but he also helps with their process problems. What he can't handle himself, he'll refer to the Diamond Research Center.

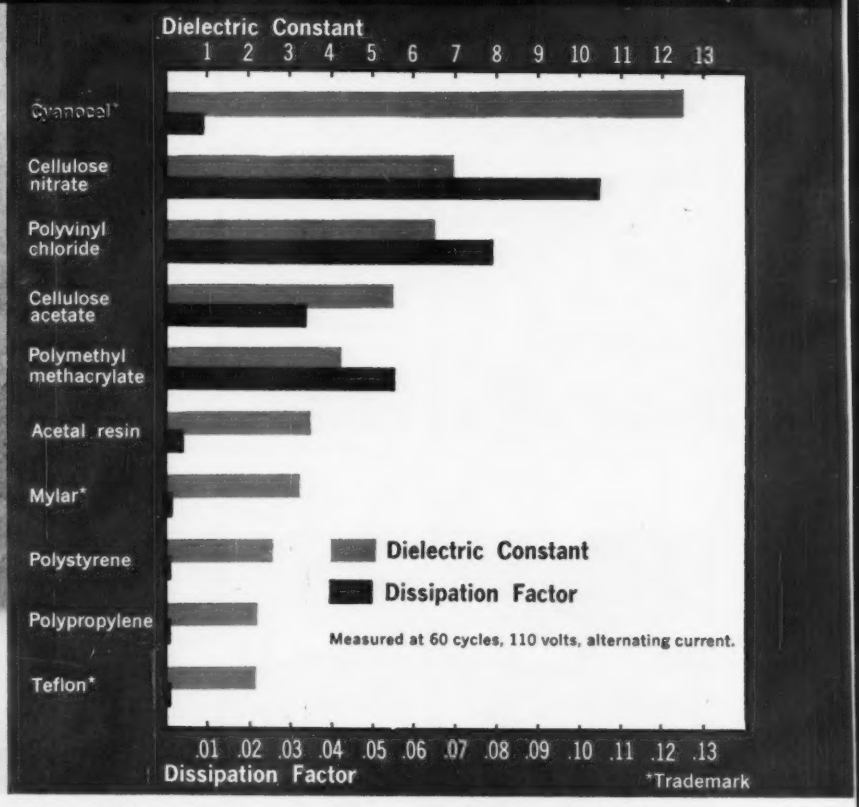
There is no finer caustic soda than Diamond's. There is no better service than Diamond's. No matter where your plant is located, you can get fast, economical delivery from one of Diamond's four strategically located producing plants. By truckloads, carloads or bargeloads.

Call any Diamond Sales Office: Chicago, Cincinnati, Cleveland, Houston, Memphis, New York, Philadelphia, Pittsburgh, St. Louis. DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals®

New cyanoethylated cellulose paces organic dielectrics





Capacitors in miniature circuit assemblies (left) are the target for Cyanamid's new dielectric.

Cyanoethylation Makes Electrical Magic

A lighter, brighter, flexible electroluminescent lamp being readied for market this week owes many of its novel properties to a new form of highly cyanoethylated cellulose developed by American Cyanamid. Cyanocel, second of the acrylonitrile-treated cellulose forms to step from the lab to commerciality, features the ability to "hold" more electricity than other organic materials (chart) and to discharge it at a high rate of efficiency.

The lamp*, is the first commercial application for Cyanocel, now being made in pilot-plant lots at Cyanamid's Willow Island, W. Va., plant. The plastic is used to carry phosphors; a layer of it, plasticized with something such as cyanoethylphthalate or an epoxy resin, is sandwiched between aluminum foil and conducting glass paper. This construction makes the lamp lighter than ceramic panel lamps, and it may pave the way for use of electroluminescent lamps in large signs, interior decorative lighting or any of a variety of applications both in building and in transportation.

But Cyanocel's properties may open markets in many other areas. It appears particularly well suited for condensers for miniaturized circuits.

Special Talent: Unlike cyanoethylated paper† (*CW, Aug. 15, '59, p. 61*), the principal advantage of which is resistance to thermal degradation, Cyanocel is not primarily an insulating material.

Instead, it will be aimed at special uses in electrical or electronic manufacturing that require high dielectric constant (the ratio of the amount of electricity a material will hold to that of air), coupled with low dissipation factor, the ability of a material to release the electricity it holds, without converting it into heat. Good insulators, on the other hand, are relatively impervious to electricity.

While there are some Cyanocel secrets, such as what type of cellulose it utilizes (which Cyanamid prefers not to discuss, in the light of pending patents), most details are available. High purity, both of reagents and in processing, is essential, Cyanamid says, or the material's dielectric constant drops.

Of three hydroxyl groups, on each

* U.S. Patents 2,901,652 and 2,918,594.

† Manufactured for General Electric by Hollingsworth & Vose Co. (East Walpole, Mass.).

glucosidic unit of cellulose, that are available for substitution, an average of 2.6-2.8 are cyanoethylated in Cyanocel. The result is a white, fibrous material that can be dissolved in polar solvents such as acetone, acetonitrile, dimethylformamide, nitromethane and pyridine. Or it can be molded at 200 C and 6,000 psi.

Films having flexibility, physical strength and transparency can be made by mechanically spreading such solutions onto a flat, smooth surface, then drying them in dust-free air.

A battery of animal tests on the new chemically modified cellulose indicate that toxicity isn't expected to be a problem. But price may be. Right now, Cyanocel sells for $27/lb., restricting its use only to applications that can capitalize best on its unique properties. While the price should drop as volume goes up, critical processing conditions are expected to keep Cyanocel among the more expensive dielectrics.

Meanwhile, Cyanamid is working out modifications of its new material, looking for ways to tailor it to new uses. As electronics components shrink in size, their materials of construction are undergoing radical changes—a trend Cyanocel and its ultimate progeny will be seeking to capitalize on.

Tougher Brick

A new, highly resistant brick for use in aluminum-melting furnaces has been developed by Kaiser Refractories & Chemicals Division of Kaiser Aluminum & Chemical Corp. (Oakland, Calif.). It features high-alumina and low-silica content, is being offered in two grades with a companion mortar. Furnace brick research is a field in which there has been much recent activity (*CW, June 20, '59, p. 105*).

Developed at the company's Spokane, Wash., metallurgical laboratories, the brick compositions were adapted for plant use by the company's research laboratory at Mexico, Mo., and the brick—called Lo-Sil and Lo-Sil Super—is being produced at the Missouri site.

Kaiser compared the Lo-Sil Super brick with that of standard 90%-alumina brick in tests at its Trentwood, Wash., works. After 185 days, the conventional brick had corroded to a

Panels exposed at 30° angle in an industrial atmosphere. Compare the difference in dirt pick-up 2 weeks after painting.

Commercial formulation of an acrylic exterior emulsion paint.

Recommended formulation for a commercial PVAc exterior emulsion paint.

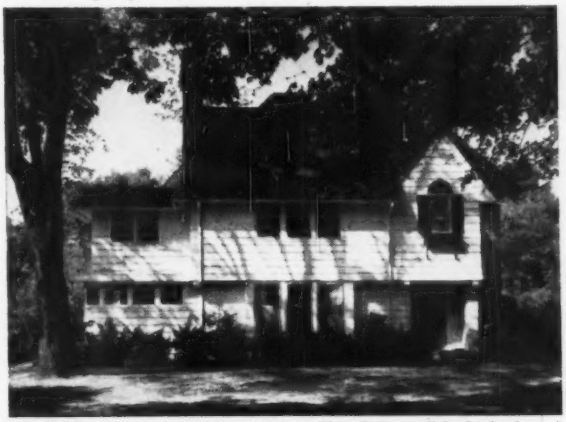
PVAc Exterior Paints look better longer

From the moment they're applied, there's no doubt about the quality of paints formulated with polyvinyl acetate copolymer emulsions. They flow smoothly . . . level well . . . dry rapidly to a tough, flexible, film. With each day's weathering, their superiority over oil paints and emulsion paints based on other latices becomes more apparent.

There's no dirt pick-up because the paint dries so rapidly, won't become tacky at normal PVC levels. Tints stay true, and whites stay white without excessive chalking. Excellent adhesion and moisture resistance prevent blistering.

Consumers find PVAc emulsion paints easy and economical to use. You'll find them easy and economical to formulate as well. Capitalize on their sales and manufacturing advantages. Ask your copolymer supplier to show you exposure data for different PVAc latex systems, and pick the one best suited to your marketing area.

For more information, write for our new folder, "PVAc for Exterior Emulsion Paints". We'll also be glad to send you information on Airco Vinyl Acetate monomer—the starting material from which your copolymer supplier makes high-quality PVAc emulsions.



The PVAc paint on this Shaker Heights, Ohio, house still looks fresh and clean 3 years after application.

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RESEARCH

depth of 9 in., while the new material suffered only ⅞-in.-deep corrosion. Calculations indicate that silicon pick-up in the molten metal would be only 0.0003% (95% less than with conventional brick) if the whole furnace were lined with the new refractory.

The new mortar has resistance equivalent to that of the Lo-Sil Super brick, which is designed for use in the most severe conditions or when metal purity is particularly important. The new brick can also be cleaned more readily, thus minimizing downtime.

PRODUCTS

Foil First: Ultrathin-gauge uranium, thorium and other reactive metal foils in thinner gauges and wider strips than previously available are now commercially sold by M & C Nuclear, Inc. (P.O. Box 898, Attleboro, Mass.), a subsidiary of Texas Instruments Inc. The uranium foil, for example, is used in nuclear experimentation as fuel for critical facilities, as neutron flux monitors, and for taking cross-sectional measurements.

•

Metalorganic Standards: A set of 24 metalorganic samples, suitable for spectrographic and chemical analysis of petroleum products, are now available from the Standard Sample Clerk, National Bureau of Standards, Washington 25, D.C. Price: $6/5 g. of each compound (e.g., dibutyl tin bis (2-ethylhexoate).

•

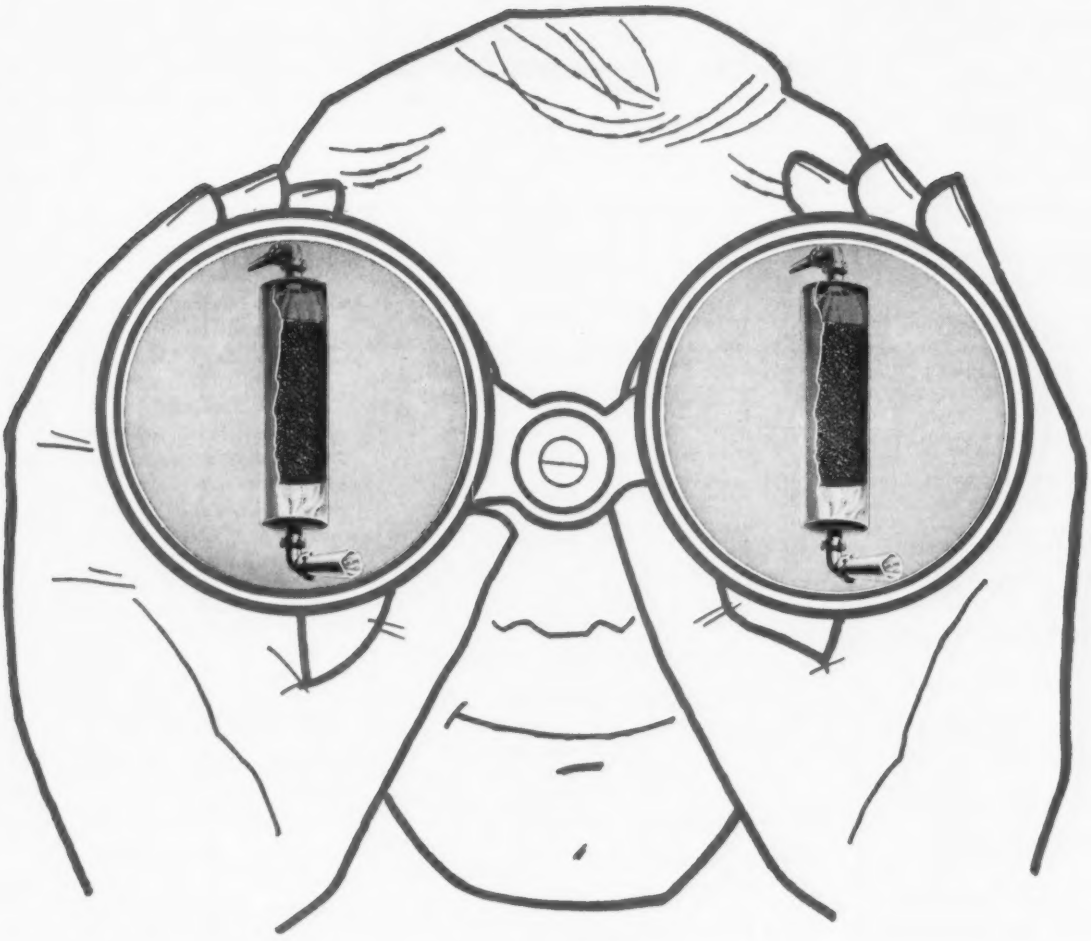
Offbeat Organics: Research chemicals now listed by Robeco Chemicals, Inc. (25 East 26th St., New York), include pristane ($C_{19}H_{40}$), squalane ($C_{30}H_{62}$) and squalene ($C_{30}H_{50}$).

EXPANSION

• Carus Chemical Co., Inc. (La Salle, Ill.), has opened a new lab to study uses (e.g., textile, paper and pulp, chemical processing) of potassium permanganate.

• G. D. Searle & Co. (Chicago) has established an animal products research department. The drug firm may step into the veterinary field.

• Allied Chemical's General Chemical Division is starting construction that will more than double its laboratory facilities near Morristown, N.J. To be completed by the



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His training and experience enables him to offer practical solutions to your present adsorption problems. If you're embarking on a pilot test, he's equipped to help your people set up a laboratory scale column system to demonstrate applicability and efficiency of Pittsburgh Carbons.

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A Subsidiary of PITTSBURGH COKE & CHEMICAL CO.

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CHEMICAL WEEK • ADVERTISERS' INDEX

May 28, 1960

tracers SECTION

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*For complete product data see catalog unit in the BUYERS' GUIDE ISSUE for 1959-60

RESEARCH

end of '61, the added space will be used for research on fluorine polymers, thermally stable fluids and refractory metals, as well as for consolidation of technical services and petrochemical research. In addition, facilities for basic studies, pilot-plant operations and agricultural chemical research will be enlarged.

• Niagara Chemical Division of Food Machinery and Chemical Corp. will start construction of a new pesticide research center at Middleport, N.Y., this summer. Included in the facilities will be laboratories for analysis of chemical residues on crops, an improved organic synthesis section and expanded biological screening and formulation laboratories.

• Norwich Pharmacal Co. (Norwich, N.Y.) recently opened a 3,000-sq.ft. radioisotope laboratory for conducting studies on labeled nitrofuran compounds.

• Electro-Tec Corp., maker of electrical components, has established a research subsidiary, Precimet Laboratories, Inc. Precimet's facilities will be built adjacent to the present Electro-Tec plant in South Hackensack, N.J.

LITERATURE

• "Properties and Uses of Commercially Available Cobalt Compounds" will be sent to persons addressing requests on company letterhead to the Cobalt Information Center, c/o Battelle Memorial Institute, 505 King Ave., Columbus 1, O. Abroad, write to Centre d'Information du Cobalt, 35, rue des Colonies, Brussels, Belgium. The two-page summary lists 46 organic and inorganic compounds, provides information on formulas, crystalline forms, etc.

• Technical information about thorium, scandium and yttrium compounds and alloys is contained in a new brochure, free on request to Vitro Chemical Co., 342 Madison Ave., New York 17, N.Y.

• A 96-page survey covering all government plastics research is now available. It reviews both basic and applied work at all agencies, tells where to get pertinent reports. "New Plastic Materials Through Government Research" may be obtained from Office of Technical Services, Commerce Dept., Washington 25, D.C. Price: $2.25.

Tracers

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***Technical Marketing—The man for whom we are** looking will be interested in chemistry, conscientious, imaginative, with managerial capacity. Will probably have 5-10 years experience ,a chemical degree, will be willing to travel as a district salesman, and will have had some experience in market development and/or sales. Kay-Fries Chemicals, Inc., 178 Madison Avenue, New York 16, N.Y.

***Wanted—Chemist—Research and Development.** Excellent opportunity for one with imagination and drive. Must be experienced in formulation of textile and paper processing auxiliaries. Give detailed information and salary requirements in first letter. P-4367, Chemical Week.

***Chemical Engineer: Experienced in Process De**velopment and production of polyvinylchloride, homopolymer and copolymer. Wanted by independent, integrated producer located in New York metropolitan area. Liberal salary and benefits. P-4490, Chemical Week.

SELLING OPPORTUNITIES AVAILABLE

***Specialty equipment company requires manu**facturers representative. Should be in the 35 to 45 age range and presently handling similar accounts. Several territories open. Submit resume to RW-4099. Chemical Week.

***Experienced Salesman wanted—industrial chem**icals. Chemical background preferred. Worth Chemical Corporation, Greensboro, N.C.

***Cincinnati based representation for Chemical** Process Equipment desired. Submit resume to: RW-4310, Chemical Week.

POSITION WANTED

***South American Pharmaceutical Distributorship.** Can invest large stock. Leaving soon for Lima, Peru. Eight years chemical field experience. University graduate. Age 35. Excellent references. PW-4396, Chemical Week.

SELLING OPPORTUNITIES WANTED

***Manufacturer Agent Available—Detroit Area** Distributor offers experienced sales representation by technically qualified men. Warehousing, tank storage, tank-car and box-car unloading, drumming facilities available and delivery. Write Deutser & Willihnganz, 615 E. Greendale—Detroit 3, Mich.

***Desire to sell chemicals in southeast on straight** commission basis, experience five years sales and six years chemical plant design, Ch.E. graduate. RA-4470, Chemical Week.

BUSINESS OPPORTUNITY

***Expanding Markets.—Well established, Colom**bian chemical company, considering expansion, desires to contact U.S. or European Chemical manufacturers interested in Latin American markets and willing to supply technical assistance under a royalty agreement or on a partnership basis for the production of chemical products in Colombia. A similar agreement with a major U.S. company has been successfully developed through a subsidiary to our company. Excellent references. Inquiries will be treated confidentially. L. Visbal.-Carrera 12-A #83-20. Bototá, Colombia.

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***Plasticizer: Lowest Priced primary phthalate** plasticizer; excellent solvation and efficiency, excellent compatibility with secondary plasticizers. Regularly available in transport trucks or drums. Mercury Chemical Corp., Edison, N.J., Liberty 8-1540.

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***Chemical tank trailers, stainless steel, rubber-**lined, pressure, all types for sale or lease. Hackett Tank Company, Inc. 541 South 10th Street, Kansas City, Kansas, Phone; Mayfair 1-2363.

***Allis-Chalmers 7' dia. x 50' long rotary dryer,** ⅝" shell, new girth gear, 50 HP drive, internal lifters, etc. Perry, 1415 N. 6th St., Phila, Pa.

***3,500 ga. steel autoclave, coils & jackets,** turbo-agitator; also pilot & experimental units; other equipment. FS-4484, Chemical Week.

***Hexamethyleneadipamide (6-6 Nylon Salt), Hex**amethylene Diamine, Adipic Acid suitable as raw materials of high purity for Textile and Plastics production available for sale. Attractive prices and terms. Quotations and laboratory test samples airmailed on request—S.I.C.I. s.r.l.—Parabiago (Milan), Italy.

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***Surplus Wanted—Chemicals, Pharmaceuticals,** Oils, Acids, Plasticizers, Resins, Dyes, Solvents, Pigments, Etc. Chemical Service Corporation, 96-02 Beaver Street, New York 5, N. Y. HAnover 2-6970.

OPPORTUNITIES

business; personal or personnel; financial; equipment; etc., may be offered or located through the classified advertising section of CHEMICAL WEEK. For more information, write to: CLASSIFIED ADVERTISING DIVISION P.O. Box 12 New York 36, New York.

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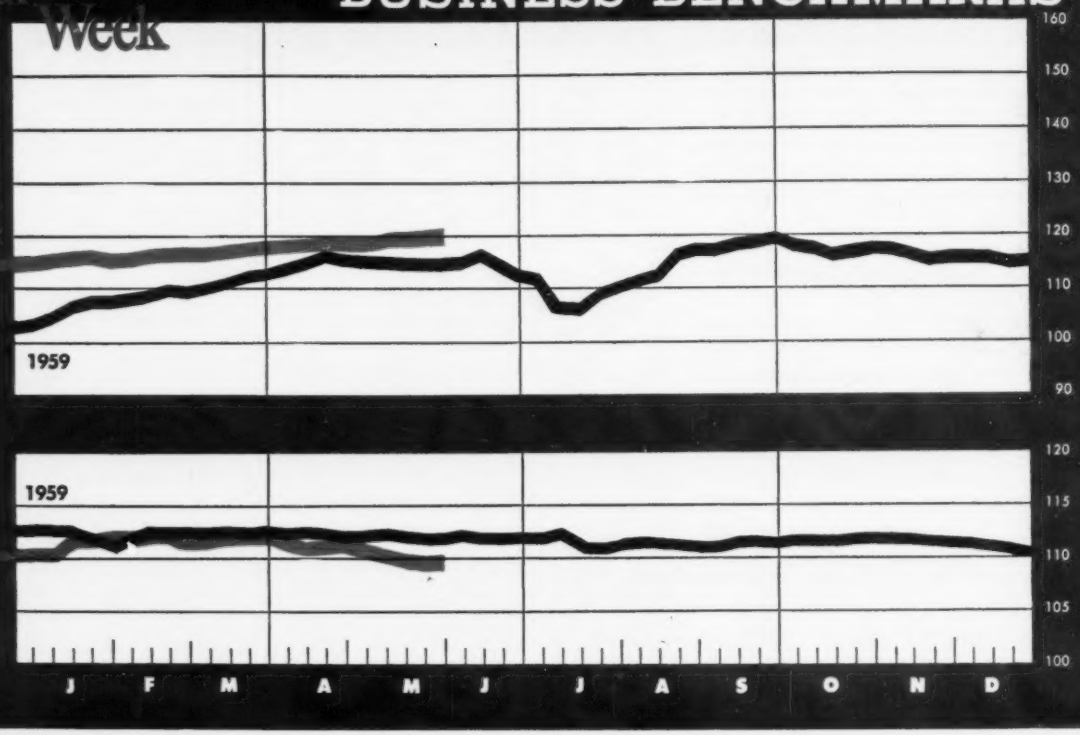
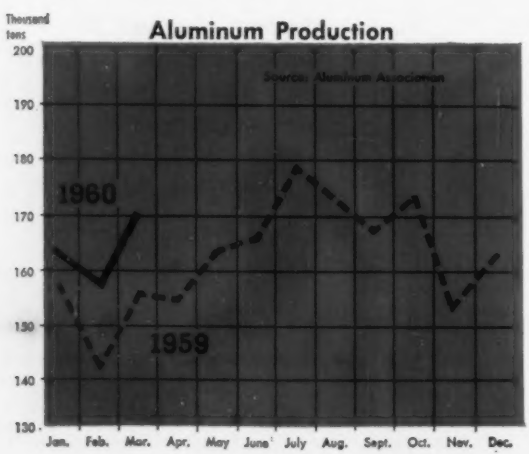


MAY 28, 1960

WEEKLY BUSINESS INDICATORS	*Latest Week*	*Preceding Week*	*Year Ago*
Chemical Week output index (1947-1949=100)	121.0	120.8	115.5
Chemical Week wholesale price index (1947=100)	108.8	108.8	112.4
Stock price index (12 firms, Standard & Poor's)	52.07	50.72	58.48
Steel ingot output (thousand tons)	2,042	2,102	2,644
Electric power (million kilowatt-hours)	13,350	13,139	12,684
Crude oil and condensate (daily av., thousand bbls.)	6,794	6,771	7,178

WHOLESALE PRICE INDICATORS (1947-49=100)	*Latest Month*	*Preceding Month*	*Year Ago*
All commodities (other than farm and foods)	128.7	128.6	128.3
Chemicals and allied products	110.2	110.1	110.0
Industrial chemicals	124.4	124.2	123.9
Paint and paint materials	119.1	119.1	118.6
Drugs, pharmaceuticals and cosmetics	94.5	94.2	92.9
Fats and oils (inedible)	52.0	50.6	60.4
Fertilizer and materials	108.8	108.8	107.5

CHEMICAL CUSTOMERS CLOSE-UP



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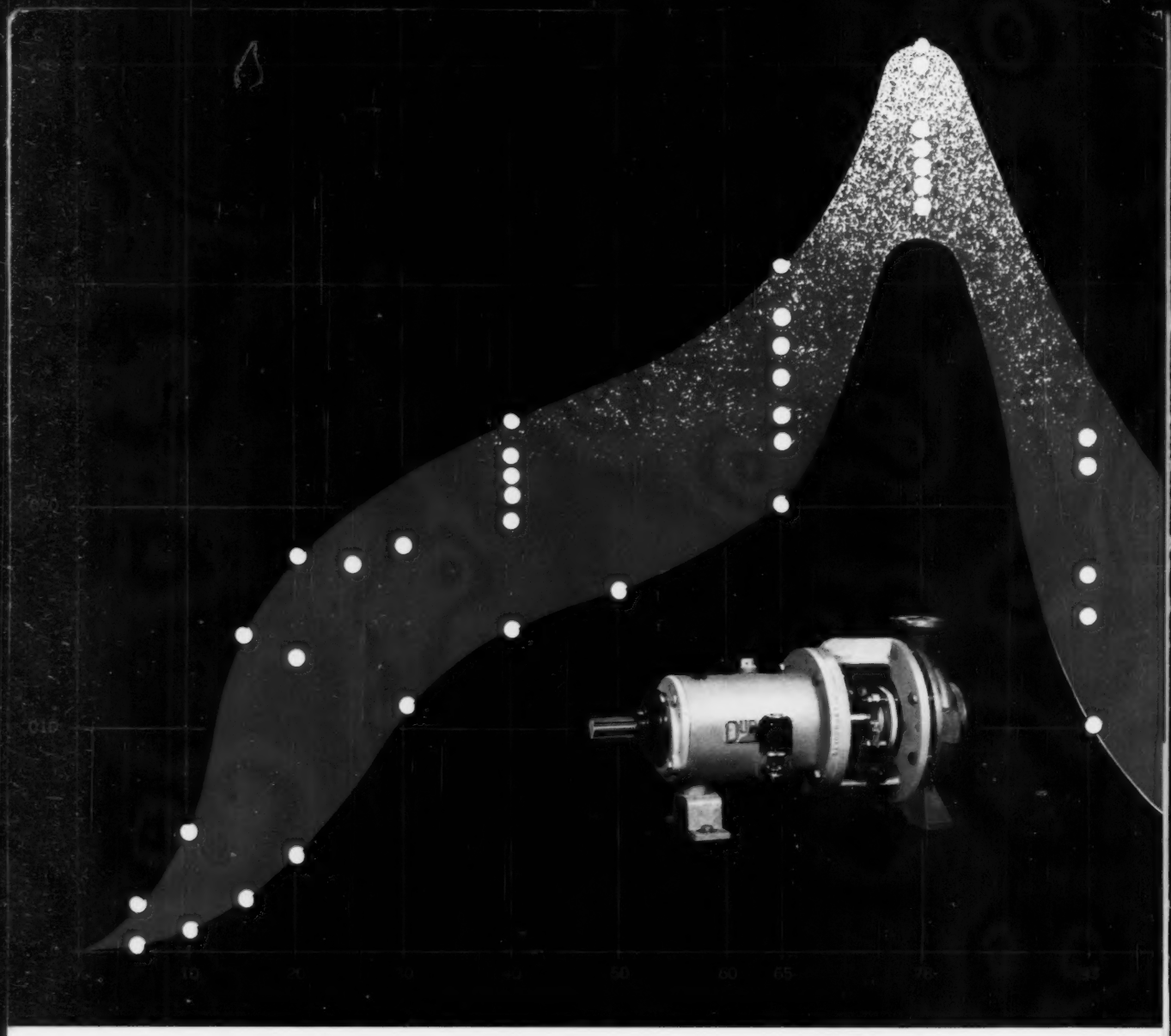

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